



July 9, 2007

Ms. Jena Sleboda
Project Officer (SR-6J)
U.S. Environmental Protection Agency Region 5
77 W. Jackson Blvd.
Chicago, IL 60604

**Subject: Revised Health and Safety Plan for Celotex Site
Chicago, Illinois
Removal Oversight
Remedial Action Contract (RAC) 2 EP-S5-06-02
Work Assignment No. 026-VOBB-055Q**

Dear Ms. Sleboda:

In accordance with the work plan approved by the United States Environmental Protection Agency on May 29, 2007, and with comments received from you on July 6, 2007, SulTRAC is submitting a revised copy of the above-referenced Health and Safety Plan (HASP) for your review.

If you have any questions regarding the HASP, please call me at (312) 201-7786.

Sincerely,

Mary Wojciechowski
SulTRAC Project Manager

Enclosure

cc: Pat Vogtman, EPA Project Officer
Ron Riesing, SulTRAC Program Manager
File



**EXHIBIT 5-2
Additional Regulations
Incorporated by OSHA for
Personal Protective Equipment**

29 CFR 1910.120: Hazardous Waste Operations and Emergency Response

29 CFR 1910.132: 41 CFR 50-204.7 (General Requirements for Personal Protective Equipment)

29 CFR 1910.133(a): ANSI Z87.1-1968 (Eye and Face Protection)

29 CFR 1910.134: ANSI Z88.2-1969 (Standard Practice for Respiratory Protection)

29 CFR 1910.135: ANSI Z89.1-1969 (Safety Requirements for Industrial Head Protection)

10 CFR 1910.136: ANSI Z41.1-1967 (Men's Safety Toe Footwear)

29 CFR 1926.100: Head Protection
29 CFR 1926.101: Hearing Protection
29 CFR 1926.102: Eyes and Face Protection
29 CFR 1926.103: Respiratory Protection

American National Standards Institute

for skin, eyes, and the respiratory system;

- The atmosphere contains less than 19.5 percent oxygen;
- Site operations involve a high potential for splash, immersion, or exposure to unexpected materials that are harmful to the skin;
- Operations are being conducted in confined, poorly ventilated areas, and the absence of hazardous substances has not yet been determined; or
- Direct-reading instruments indicate high levels of unidentified vapors or gases in the air.

It may be necessary to base the decision to use Level A protection on indirect evidence. Other conditions that may indicate the need for Level A protection include:

- Confined spaces;

- Suspected or known highly toxic substances, especially when field equipment is not available to test concentrations;
- Visible indicators such as leaking containers or smoking chemical fires; and
- Potentially dangerous tasks, such as initial site entry.

5.1.2 Level B

Level B protection is required under circumstances requiring the highest level of respiratory protection, with a lesser level of skin protection. Potential Level B equipment includes: positive pressure, full face-piece SCBA or positive pressure supplied air respirator with escape SCBA; inner and/or outer chemical-resistant gloves; face shield; hooded chemical resistant clothing; coveralls; and outer chemical-resistant boots.

Meeting any of the following criteria warrants use of Level B protection:

- The type and atmospheric concentration of substances have been identified and require a high level of respiratory protection, but less skin protection than Level A;
- The atmosphere contains less than 19.5 percent oxygen; or
- The presence of incompletely identified vapors and gases is indicated but they are not suspected of being harmful to the skin.

EXHIBIT 5-3 Suggested Action Levels for PPE*	
Level of Protection	Action Level (in ppm above background)
A	500 to 1,000 ppm
B	5 to 500 ppm
C	Background to 5 ppm
D	N/A
* Note that action levels for PPE based on vapor concentration are only for situations where the identity of the vapor or gas constituents are unknown. They do not address IDLH environments. Refer to Section 6.9 for more information.	

**RESPONSE ACTION CONTRACT 2 FOR
REMEDIAL, ENFORCEMENT OVERSIGHT, AND
NON-TIME CRITICAL REMOVAL ACTIVITIES
IN REGION 5**

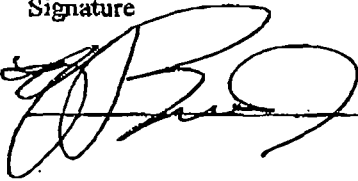
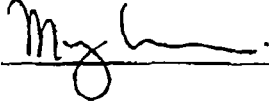
**HEALTH AND SAFETY PLAN
CELOTEX SUPERFUND SITE
COOK COUNTY, CHICAGO, ILLINOIS**

**Prepared for
United States Environmental Protection Agency
Region 5
77 West Jackson Boulevard
Chicago, IL 60604**

Work Assignment No:	026-VOBB-055Q
US EPA Region:	5
Date Prepared:	July 9, 2007
Contract No.:	EP-S5-06-02
Prepared by:	SulTRAC
SulTRAC Project Manager:	Mary Wojciechowski
Telephone No:	(312) 201-7786
EPA Work Assignment Manager:	Jena Sleboda
Telephone No:	(312) 353-1263

REVIEWS AND APPROVALS
CLIENT NAME: U.S. Environmental Protection Agency Region 5
CONTRACT NO.: EP-S5-06-02
CELOTEX SUPERFUND SITE
COOK COUNTY, CHICAGO, ILLINOIS

We the undersigned have read and approve of the health and safety guidelines presented in this health and safety plan for on-site work activities at the Celotex Superfund site.

Name	Signature	Date
<u>Richard L. Ecord Jr., CIH, CSP</u> SulTRAC EM Inc. (SulTRAC) Health and Safety Representative		<u>7/3/07</u>
<u>Mary Wojciechowski</u> SulTRAC Project Manager		<u>6/20/07</u>

This statement certifies that SulTRAC has assessed the type, risk level, and severity of hazards for the project and has selected appropriate personal protective equipment for site personnel in accordance with Occupational Safety and Health Administration regulations at Title 29 of the *Code of Federal Regulations*, Part 1910.132.

Certified by

<u>Name:</u>		
SulTRAC		
Technical Reviewer		

EMERGENCY INFORMATION
POST ON SITE
24-HOUR EMERGENCY CONTACTS AND ROUTE TO HOSPITAL

Emergency Contact	Telephone No.
U.S. Coast Guard National Response Center	(800) 424-8802
InfoTrac Chemical Monitoring System	(800) 535-5053
WorkCare	(800) 455-6155
Fire Department	911 or (312) 747-8635
Police Department	911 or (312) 747-7511
SulTRAC Personnel:	
Health and Safety Representative: Richard Ecord, CIH, CSP	(404) 225-5527
Office Health and Safety Coordinator: David Sloman	(847) 970-0274
Project Manager: Mary Wojciechowski	(312) 201-7786
Site Safety Coordinator: Mary Wojciechowski	(312) 201-7786
Client Contact:	
U.S. Environmental Protection Agency Region 5	
77 West Jackson Boulevard	
Chicago, IL 60604	(312) 353-2000
Medical Emergency	
Hospital Name:	Mont Sinai Hospital
Hospital Address:	2720 West 15 th Street Chicago, IL 60608
Hospital Telephone No.:	Emergency – 911 General – (773) 542-2000
Ambulance Telephone No.:	911
Route to Hospital: (see next page hospital route map)	
Start going NORTH on 2800 South Sacramento Avenue	
Turn RIGHT onto West 26 th Street	
Turn LEFT onto South California Avenue	
Turn RIGHT onto West Ogden Avenue.	
Turn RIGHT onto South Fairfield Avenue	
South Fairfield Avenue becomes West 15TH Street	
End at Mont Sinai Hospital	

Note: This sheet must be posted on site.

EMERGENCY INFORMATION
POST ON SITE
HOSPITAL ROUTE MAP



These will be posted in the CH2M Hill Office Site Office Located at 3000 S. Albany.

Directions from Celotex Site to Mont Sinai Hospital:

Start going NORTH on 2800 South Sacramento Avenue
Turn RIGHT onto West 26th Street
Turn LEFT onto South California Avenue
Turn RIGHT onto West Ogden Avenue.
Turn RIGHT onto South Fairfield Avenue
South Fairfield Avenue becomes West 15TH Street
End at Mount Sinai Hospital

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Appendix

- A SULTRAC FORMS
- B SAFE WORK PRACTICES
- C RESPIRATORY HAZARD ASSESSMENT (FORM RP-2)

Attachment

- 1 REMEDIATION CONTRACTOR AIR MONITORING PROGRAM
- 2 MATERIAL SAFETY DATA SHEETS

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1.0 INTRODUCTION

SulTRAC received Work Assignment No. 026-VOBB-055Q from the U.S. Environmental Protection Agency (US EPA) under Contract No. EP-S5-06-02 to conduct oversight of the potentially responsible party's (PRP's) development of the removal design and removal action at the Celotex Superfund site located in Chicago, Illinois. The site-specific health and safety provisions in this document have been developed for use during technical field oversight of the PRP's removal actions to be performed at the Celotex site. This document addresses items specified under Occupational Safety and Health Administration (OSHA) regulations at Title 29 of the *Code of Federal Regulations* (CFR), Part 1910.120 (b), "Final Rule." This health and safety plan (HASP) will be available to all on-site personnel who may be exposed to hazardous on-site conditions, including SulTRAC and subcontractor personnel participating in the technical field oversight of the PRP's removal action activities, and all site visitors, including regulatory agency representatives.

The HASP defines requirements and designates protocols to be followed during the technical field oversight of PRP's removal action activities at the Celotex site. All personnel on site, including SulTRAC and subcontractor employees and site visitors, must be informed of emergency response procedures and any potential fire, explosion, health, or safety hazards associated with on-site activities. This HASP summarizes potential hazards and defines protective measures planned for activities at the site.

This plan must be reviewed and approved by both SulTRAC health and safety representatives (HSR) or a designee and the SulTRAC project manager (see the reviews and approvals form after the contents in this document). All personnel must sign the compliance agreement form in Appendix A before they enter the site. Protocols established in this HASP are based on site conditions and health and safety hazards known or anticipated to be present and on available site data. This plan is intended solely for use during proposed activities described in the corresponding site-specific work plan. Specifications are subject to review and revision based on actual conditions encountered in the field during site activities. The SulTRAC project manager and the SulTRAC HSR must approve significant revisions to this plan. SulTRAC employees must also follow safety requirements taught during safety training and described in the SulTRAC "Health and Safety Manual."

2.0 HEALTH AND SAFETY PERSONNEL AND PLAN ENFORCEMENT

This section describes the responsibilities of project personnel, summarizes requirements for subcontractors and visitors who wish to enter the Celotex site, and discusses HASP enforcement.

2.1 PROJECT PERSONNEL

The following personnel and organizations are associated with activities planned at the site. The organizational structure will be reviewed and updated as necessary during the project.

<u>Name/Title</u>	<u>Responsibility</u>	<u>Telephone No.</u>
Client Representative:		
Jena Sloboda	Work Assignment Manager	(312) 886-4071
SulTRAC Personnel:		
Mary Wojciechowski	Project Manager and SSC	(312) 201-7786
Richard Ecord, CIH, CSP	SulTRAC HSR	(404) 225-5527
David Sloman, CSP	SulTRAC HSR	(847) 970-0274
Lea Cole	Field Manager	(312) 443-0550
Manali Desai	Field Manager	(312) 201-7493

The SulTRAC project manager, field manager, SSC, and HSR will be responsible for implementing and enforcing the provisions of this HASP. Their duties and the expectations for SulTRAC employees are described in the following sections.

2.1.1 Project Manager and Field Manager

The SulTRAC project manager has ultimate responsibility for ensuring that the requirements set forth in this HASP are implemented. Some of this responsibility may be achieved through delegation to site-dedicated personnel who report directly to the project manager. The project manager will regularly confer with site personnel regarding safety and health compliance.

The SulTRAC field manager will oversee and direct field activities and has day-to-day responsibility for ensuring that the HASP is implemented. The field manager will monitor subcontractor compliance with the HASP. The field manager will report directly to the project manager any health and safety-related issues.

2.1.2 Site Safety Coordinator

The SulTRAC SSC will be appointed by the project manager and will be responsible for field implementation of tasks and procedures contained in this HASP, including air monitoring, establishing a decontamination protocol, and ensuring that the Daily Tailgate Safety Meeting form (Form HST-2) and the Compliance Agreement (Form HSP-4) (see Appendix A) have been signed by all personnel working on site. The SSC will have advanced experience in field work and will be familiar with health and safety requirements specific to the project. The SSC will also maintain the Daily Site Log (Form SSC-1 in Appendix A).

2.1.3 Health and Safety Representative

The SulTRAC HSR is responsible for administering the company health and safety program. The HSR will act in an advisory capacity to project managers and site personnel for project-specific health and safety issues. The SulTRAC project manager will establish a liaison between officers and representatives of EPA Region 5 and the HSR on matters relating to health and safety.

2.1.4 SulTRAC Employees

SulTRAC employees are expected to fully participate in implementing the site HASP by obtaining necessary training, attending site safety meetings, always wearing designated personal protective equipment (PPE), complying with site safety and health rules, and advising the SulTRAC SSC of health and safety concerns at the site.

2.2 SUBCONTRACTORS

SulTRAC will not use subcontractor personnel to conduct field oversight at the Celotex Site.

2.3 VISITORS

All site visitors will be required to read the HASP and sign the Compliance Agreement form (see Appendix A). Visitors will be expected to comply with relevant OSHA requirements. Visitors will also be expected to provide their own PPE required by the HASP. Visitors who have not met OSHA training, medical surveillance, and PPE requirements are not permitted to enter areas where exposure to hazardous materials is possible.

2.4 HEALTH AND SAFETY PLAN ENFORCEMENT

This HASP applies to all site activities and all personnel working on the Celotex site. The HASP will be rigorously enforced. Violators of the HASP will be verbally notified on first violation, and the violation will be noted by the SulTRAC SSC in a field logbook. On second violation, the violator will be notified in writing, and the SulTRAC project manager and the violator's supervisor will be notified. A third violation will result in a written notification and the violator's eviction from the site. The written notification will be sent to human resources development and the HSR.

Personnel will be encouraged to report to the SSC any conditions or practices that they consider detrimental to their health or safety or that they believe violate applicable health and safety standards. These reports may be made orally or in writing. Personnel who believe that an imminent danger threatens human health or the environment will be encouraged to bring the matter to the immediate attention of the SSC for resolution.

At least one copy of this HASP will be available to all site personnel at all times. The SSC will discuss minor changes in HASP procedures at the beginning of each work day at the daily tailgate safety meeting. Significant revisions to the plan must be discussed with the HSR and project manager.

3.0 SITE BACKGROUND

The following sections describe the Celotex site, its history, and activities planned for this project.

3.1 SITE DESCRIPTION

The Celotex Superfund Site is located at 2800 S. Sacramento Avenue in Chicago, Cook County, Illinois, in the northeastern section of the state along the western shoreline of Lake Michigan. The site is

bordered to the north by 27th Street and to the east by Sacramento and Whipple Avenues. Businesses and residences are located across Sacramento Avenue. The site is bordered on the west by Albany Street, with residences located across the street. The Chicago Sanitary and Ship Canal is located about 1,500 feet to the south. The nearest residences are located less than 200 feet from the site.

The Main Site is currently covered with approximately 1 foot of gravel and operates as a semi-trailer parking lot. The Celotex property was used for making, storing, and selling asphalt-roofing products. Former operations at the 24-acre Main Site during the approximate period of 1911 to 1989 most likely released polycyclic hydrocarbons (PAHs) to the ground and into the air. Facility closure (1989), demolition of the Main Site (1993), and subsequent actions have all taken place, and it has been determined that no ongoing releases are associated with historical or current operations at the site.

In the summer of 2006, samples were collected at nearby residences to identify the properties that have been contaminated by the release of PAHs from the site. In the fall of 2006, samples were collected at the Main Site to evaluate the thickness of the current gravel cover, and what, if any, contamination is in the fill that lies underneath the gravel. Cleanup of residential soils and placement of the 2-foot cover remedy on the Main Site are scheduled for 2007.

The major components of the selected removal include the following:

- Design and implementation of a stable 2-foot cover on the Main Site
- Cleanup of nearby residential properties

Site location and layout are shown on Figures 3-1 and 3-2.

3.2 SITE HISTORY

The Maxwell brothers owned the property from 1910 until 1918. Asphalt roofing products were manufactured, stored, and distributed on the property from the approximate period of 1911 to 1989. Types of work that occurred on site included the following activities: distillation of coal tar to produce refined tars, pitch, oil, creosote, naphthalene, coal tar paints, enamels, pipe coating, and protective coating; manufacture of roofing shingles; and blending material to make bituminous concrete, pavement, and driveway sealers.

In 1918, Barrett Roofing purchased the property and began producing bituminous-based roofing products and constructing a tank farm for storage. Barrett Roofing operated at the site until 1942, when Allied Chemical bought the property, continued manufacturing roofing products, and expanded the operations and tank farm.

In 1967, Celotex Corporation expressed interest in the property, purchased several parcels of the site, and continued to do so over the years until it had acquired the entire 24 acres in 1974. Celotex manufacturing operations remained the same as the previous owners and continued until 1982. In 1983, the company officially closed because of declining sales of its roofing products.

In May 1989, the Illinois Environmental Protection Agency (IEPA) received citizen complaints about large amounts of coal tar present over much of their property caused by Celotex. IEPA completed a preliminary assessment in December 1989. In 1991 and 1992, IEPA conducted inspections and sampling at the site and prepared an expanded site inspection report in 1992. On-site soils had been highly contaminated by the manufacturing operations. At the time of the inspection by Illinois EPA, a number of the old manufacturing buildings and tanks and a trench that contained contaminated material remained on the property. The trench was 635 feet long and contained a tar-like substance. IEPA noted that it appeared that trucks had been hauling an oily waste out of the facility, and a substantial amount of spillage was observed. IEPA further noted that the banks of the inlet to the Chicago Sanitary and Ship Canal were stained black and that sludge was present at the bottom of the inlet.

IEPA also noted that scavengers had removed material from the property. Signs of people residing in the old warehouse and other areas of the property were also observed. The samples collected by IEPA detected high levels of PAHs in contaminated areas on the property and from the bank of the Sanitary and Ship Canal inlet.

On October 28, 1993, the Agency for Toxic Substances and Disease Registry (ATSDR) evaluated the site based on IEPA's expanded site inspection report. ATSDR concluded that a short-term and chronic hazard was posed by potential direct-contact exposure to soils that contain high concentrations of PAHs located on the Celotex property. ATSDR also stated that chronic exposures to residential surface soils contaminated with elevated levels of PAHs were a public health concern.

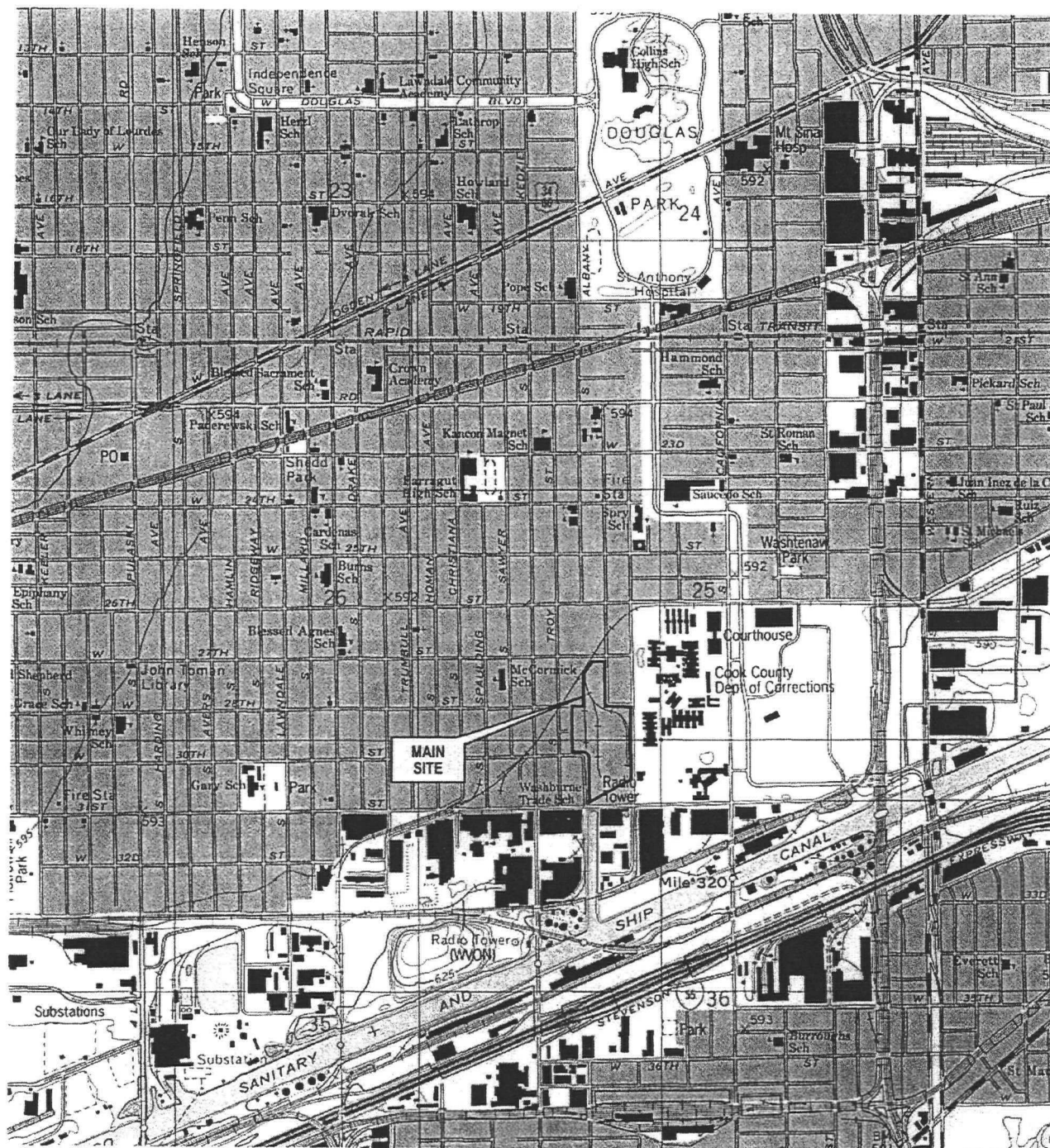
On November 1, 1993, U.S.EPA conducted an inspection of the site and prepared a site assessment report. At that time, the manufacturing facilities and buildings had been demolished and subsequent

actions had taken place. EPA concluded that no ongoing releases were associated with historical operations at the site. The site is currently covered with 1 foot of gravel and operates as a semi-trailer parking lot.

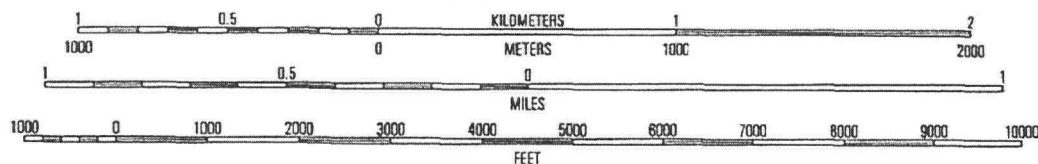
In summer 2006, samples were collected at nearby residences to identify the properties that have been contaminated from the releases of PAHs from the site. In the fall of 2006, samples were collected at the site to evaluate the thickness of the current gravel cover and what, if any, contamination is in the fill that lies underneath the gravel. Cleanup of residential soils and placement of the 2-foot cover remedy are scheduled for 2007.

FIGURE 3-1
SITE LOCATION

SOURCE: MODIFIED FROM CH2MHILL, "Final Main Site Evaluation Report for the Celotex Facility", February 2007



SCALE 1:24 000



NORTH

Quadrangle Location

Source: U.S.G.S. 7.5-Minute Quadrangle for Englewood, Illinois, 1997

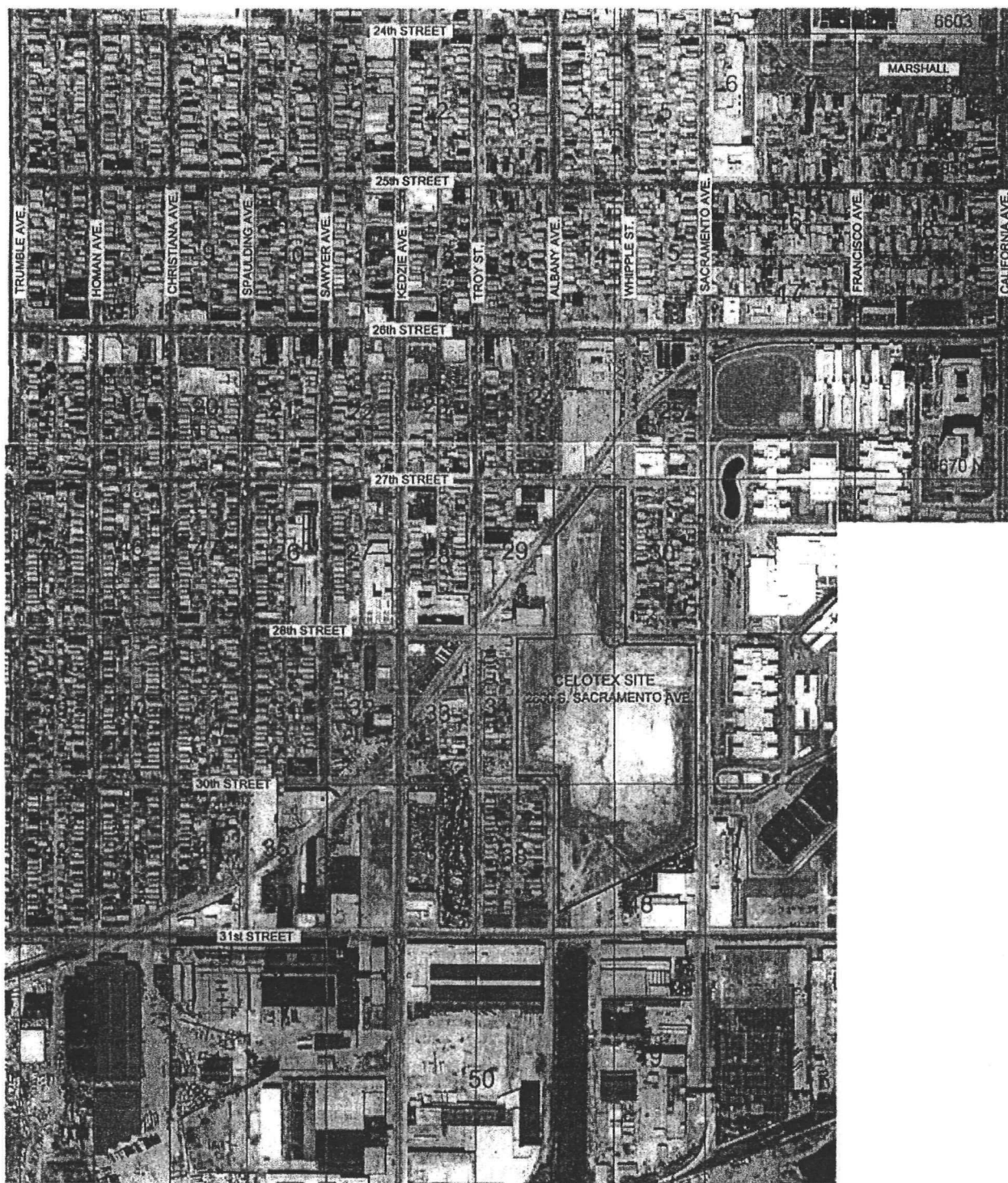
E327757.CE.10.1 Fig 1-1 Celotex_DRAFT_030906_v5 06-19-06 kj/jls

Figure 1-1
Main Site Location
Main Site Evaluation Report
Former Celotex Site
Chicago, Illinois

CH2MHILL

**FIGURE 3-2
SITE LAYOUT**

SOURCE: MODIFIED FROM MODIFIED FROM CH2MHILL, "Final Main Site Evaluation Report for the Celotex Facility", February 2007



LEGEND

27

Block Number

— Northing and Easting Lines

— Main Site

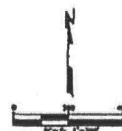


Figure 1-2
Aerial Photograph
Main Site Evaluation Report
Former Celotex Site
Chicago, Illinois
CH2MHILL

3.3 PLANNED ACTIVITIES

Tetra Tech will conduct technical field oversight of the PRP's removal action activities, which include the following tasks:

- Excavation of contaminated soil from selected residential areas
- Installation of a 2-foot soil cover on the Main Site

4.0 SITE-SPECIFIC HAZARD EVALUATION

Field activities and physical features of the site may expose field personnel to a variety of hazards. This section provides information on potential hazards related to site activities and the nature of impacts from hazardous materials. Potential chemical and physical hazards related to site activities are discussed below.

4.1 CHEMICAL HAZARDS

Chemicals that may be present at the site are listed in Table 4-1. These chemicals pose various physical, chemical, and toxicological hazards. Potential routes of exposure include dermal (skin) contact, inhalation, and ingestion. The chemicals may also contaminate equipment, vehicles, instruments, and personnel. The overall health threat from exposure to these chemicals is uncertain because (1) actual concentrations that could result in exposure cannot be predicted, (2) the actual duration of exposure is unknown, and (3) the effects of low-level exposure to a mixture of chemicals cannot be predicted. However, SulTRAC believes that the potential for high-level exposure is limited.

Specific information on potential chemical hazards at the site is provided in Table 4-1, including exposure limits, anticipated exposure routes, and toxic characteristics. Table 4-2 provides a task hazard analysis of the planned field activities listed in Section 3.3.

The Material Safety Data Sheets (MSDS) included in the attachment to this HASP summarize health and safety information for hazardous materials that will be brought to the site by the PRP contractor, such as laboratory reagents, decontamination solutions, and sample preservatives. These materials are as follows:

TABLE 4-1

**POTENTIAL CHEMICAL HAZARDS
CELOTEX SITE**

Chemical and Media	Exposure Limits and IDLH Level	Exposure Routes	Toxic Characteristics
Coal Tar Pitch Volatiles (PAHs)	PEL = TWA 0.2 mg/m ³ REL = Ca TWA 0.1 mg/m ³ TLV = TWA 0.2 mg/m ³ IDLH = 80 mg/m ³	Inhalation, skin, eyes	Dermatitis, bronchitis

Notes:

IDLH Immediately dangerous to life or health

mg/m³ Milligram per cubic meter

OSHA Occupational Safety and Health Administration

PEL Permissible exposure limit

REL Recommended exposure limit

TLV Threshold limit value

TWA Time-weighted average

Sources: ACGIH. "Threshold Limit Values and Biological Exposure Indices for 1998." Latest edition.

National Institute for Occupational Safety and Health. 2005. "Pocket Guide to Chemical Hazards." U.S. Department of Health and Human Services. U.S. Government Printing Office. Washington, DC.

TABLE 4-2
TASK HAZARD ANALYSIS
CELOTEX SITE

Task	Potential Hazard	Controls	Initial Level of Protection	Upgraded Level of Protection
Oversight of contaminated soil excavation and soil cover installation	Chemicals (PAHs, Alconox, isobutylene, methane) Dust Heavy equipment Noise Utilities Heat and cold stress	Air monitoring Ear plugs Surveys for buried and overhead utilities Limiting access to work area.	Level D = Hard hat, boots, safety glasses, gloves	Modified Level D = Level D plus dust mask and coveralls.

- Alconox
- Isobutylene
- Methane

4.2 PHYSICAL HAZARDS

Physical hazards associated with site activities present a potential threat to on-site personnel. Dangers are posed by heavy equipment, utility and power lines, slippery surfaces, unseen obstacles, noise, heat, cold, and poor illumination.

Injuries may result, for example, from the following:

- Accidents caused by slipping, tripping, or falling
- Use of improper lifting techniques
- Moving or rotating equipment
- Equipment mobilization and operation (such as electrocution from contact with overhead or underground power lines)
- Improperly maintained equipment

Injuries that result from physical hazards can be avoided by using safe work practices (SWP) and employing caution when working with machinery. Specific SWPs applicable to the Celotex site are listed in Section 9.5 and are provided in Appendix B of this HASP. To ensure a safe workplace, the SSC will conduct and document regular safety inspections and will make sure that all SulTRAC workers and visitors are informed of any potential physical hazards related to the site. Physical hazards that have been identified at this site include the following:

- Heat and cold stress
- Buried and overhead utilities
- Heavy Equipment
- Noise

5.0 TRAINING REQUIREMENTS

All on-site personnel who may be exposed to hazardous conditions, including SulTRAC personnel and site visitors who will participate in on-site activities, will be required to meet training requirements outlined in 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response." All SulTRAC oversight personnel and site visitors will have received 40-hour and annual refresher training and will receive medical monitoring. All personnel and visitors entering the site will be required to review this HASP and sign the Compliance Agreement form (HSP-4), and site workers will be required to sign the Daily Tailgate Safety Meeting form (HST-2) (see Appendix A).

Before on-site activities begin, the SulTRAC SSC will present a briefing for all personnel who will participate in on-site activities. The following topics will be addressed during the pre-work briefing:

- Names of the SSC and the designated alternate
- Site history
- Work tasks
- Hazardous chemicals that may be encountered on site
- Physical hazards that may be encountered on site
- PPE, including type or types of respiratory protection to be used for work tasks
- Training requirements
- Environmental surveillance (air monitoring) equipment use and maintenance
- Action levels and situations requiring upgrade or downgrade of level of protection
- Site control measures, including site communications, control zones, and SWPs
- Decontamination procedures
- Emergency communication signals and codes
- Environmental accident emergency procedures (in case contamination spreads outside the exclusion zone)
- Personnel exposure and accident emergency procedures (in case of falls, exposure to hazardous substances, and other hazardous situations)

- Fire and explosion emergency procedures
- Emergency telephone numbers
- Emergency routes

Any other health and safety-related issues that may arise before on-site activities begin will also be discussed during the pre-work briefing.

Issues that arise during on-site activities will be addressed during tailgate safety meetings to be held daily before the workday or shift begins and will be documented in the Daily Tailgate Safety Meeting form (Form HST-2 in Appendix A). Any changes in procedures or site-specific health and safety-related matters will be addressed during these meetings.

6.0 PERSONAL PROTECTION REQUIREMENTS

The levels of personal protection to be used for work at the Celotex site have been selected based on known or anticipated physical hazards; types and concentrations of contaminants that may be encountered on site; and contaminant properties, toxicity, exposure routes, and matrixes. The following sections describe protective equipment and clothing; reassessment of protection levels; limitations of protective clothing; and respirator selection, use, and maintenance.

6.1 PROTECTIVE EQUIPMENT AND CLOTHING

Personnel will wear protective equipment when (1) site activities involve known or suspected atmospheric contamination; (2) site activities may generate vapors, gases, or particulates; or (3) direct contact with hazardous materials may occur. The anticipated levels of protection selected for use by field personnel during site activities are listed in Table 4-2, Task Hazard Analysis. Based on the anticipated hazard level, personnel will initially perform field tasks in Level D protection. If site conditions or the results of air monitoring during on-site activities warrant a higher level of protection, all field personnel will withdraw from the site, immediately notify the SulTRAC SSC, and wait for further instructions. Equipment and clothing required for Level D, Level C, and Level B protection are described below.

- Level D

- Coveralls or work clothes, if applicable
- Chemical-resistant clothing (such as Tyvek or Saranex coveralls)(optional)
- Outer gloves (neoprene, nitrile, or other), if applicable
- Disposable inner gloves (such as latex or vinyl)(optional)
- Boots with steel-toe protection and steel shanks
- Disposable boot covers or chemical-resistant outer boots (optional)
- Safety glasses or goggles
- Hard hat (face shield optional)
- Hearing protection (for areas with a noise level exceeding 85 decibels on the A-weighted scale)
- Level C
 - Coveralls or work clothes, if applicable
 - Chemical-resistant clothing (such as Tyvek or Saranex coveralls)
 - Outer gloves (neoprene, nitrile, or other), if applicable
 - Disposable inner gloves (latex or vinyl)
 - Boots with steel-toe protection and steel shanks
 - Disposable boot covers or chemical-resistant outer boots
 - Full- or half-face, air-purifying respirator with National Institute for Occupational Safety and Health (NIOSH)-approved cartridges to protect against organic vapors, dust, fumes, and mists. (Cartridges used for gas and vapors must be replaced in accordance with the change-out schedule described in the Respiratory Hazard Assessment form [Form RP-2] in Appendix C.)
 - Safety glasses or goggles (with a half-face respirator only)
 - Hard hat (face shield optional)
 - Hearing protection (for areas with a noise level exceeding 85 decibels on the A-weighted scale)
- Level B
 - Chemical-resistant clothing (such as Tyvek or Saranex coveralls)

- Outer gloves (neoprene, nitrile, or other)
- Disposable inner gloves (latex or vinyl)
- Boots with steel-toe protection and steel shanks
- Disposable boot covers or chemical-resistant outer boots
- NIOSH-approved, pressure-demand airline respirator with a 5-minute escape cylinder or self-contained breathing apparatus (SCBA)
- Hard hat (face shield optional)
- Hearing protection (for areas with a noise level exceeding 85 decibels on the A-weighted scale)

6.2 REASSESSMENT OF PROTECTION LEVELS

PPE levels will be upgraded or downgraded based on a change in site conditions or investigation findings. Hazards will be reassessed when a significant change in site conditions occurs. Some indicators of the need for reassessment are as follows:

- Commencement of a new work phase, such as the start of a significantly different sampling activity or work that begins on a different portion of the site
- A change in job tasks during a work phase
- A change of season or weather
- Temperature extremes or individual medical considerations that would limit the effectiveness of PPE
- Discovery of contaminants other than those previously identified
- A change in ambient levels of airborne contaminants (see the action levels listed in Table 8-1)
- A change in work scope that affects the degree of contact with contaminated media

6.3 LIMITATIONS OF PROTECTIVE CLOTHING

PPE clothing ensembles designated for use during site activities have been selected to provide protection against contaminants at known or anticipated on-site concentrations and physical states. However, no protective garment, glove, or boot is entirely chemical-resistant, nor does any protective clothing provide

protection against all types of chemicals. Permeation of a given chemical through PPE depends on the contaminant concentration, environmental conditions, physical condition of the protective garment, and resistance of the garment to the specific contaminant. Chemical permeation may continue even after the source of contamination has been removed from the garment.

All site personnel will use the procedures presented below to obtain optimum performance from PPE.

- When chemical-protective coveralls become contaminated, don a new, clean garment after each rest break or at the beginning of each shift.
- Inspect all clothing, gloves, and boots both before and during use for the following:
 - Imperfect seams
 - Non-uniform coatings
 - Tears
 - Poorly functioning closures
- Inspect reusable garments, boots, and gloves both before and during use for visible signs of chemical permeation, such as the following:
 - Swelling
 - Discoloration
 - Stiffness
 - Brittleness
 - Cracks
 - Any sign of puncture
 - Any sign of abrasion

Reusable gloves, boots, or coveralls that exhibit any of the characteristics listed above must be discarded. Reusable PPE will be decontaminated in accordance with procedures described in Section 10.0 and will be neatly stored in the support zone away from work zones.

6.4

RESPIRATOR SELECTION, USE, AND MAINTENANCE

SulTRAC and subcontractor personnel will be informed of the proper use, maintenance, and limitations of respirators during annual health and safety refresher training and the pre-work briefing. Any on-site personnel who will use a tight-fitting respirator must pass a qualitative fit test for the respirator that follows the fit testing protocol provided in Appendix A of the OSHA respirator standard (29 CFR 1910.134). Fit testing must be repeated annually or when a new type of respirator is used.

Respirator selection is based on the assessment of the nature and extent of hazardous atmospheres anticipated during field activities. This assessment includes a reasonable estimate of employee exposure to respiratory hazards and identification of each contaminant's anticipated chemical form and physical state.

A respiratory hazard assessment has been conducted for each work task that will require respirator use at the Celotex site. The results of this assessment are documented in the Respiratory Hazard Assessment form (Form RP-2), which has been approved by the HSR. The completed Form RP-2 is included in Appendix C and defines respiratory protection requirements for the project. Attachment 1 includes the action levels listed in the PRP contractor (CH2M Hill) HASP for use of Level C protection. Amendments to this HASP and to Form RP-2 will be discussed during daily tailgate safety meetings.

Respiratory protection options include the following when the atmospheric contaminant is an identified gas or vapor and its concentration is known or can be reasonably estimated:

- An atmosphere-supplying respirator (air-line or SCBA)
- An air-purifying respirator equipped with a NIOSH-certified, end-of-service-life indicator (ESLI) for the identified contaminant. If no ESLI is available, a change-out schedule for cartridges must be developed based on objective data or information. Respirator cartridge selection and change-out schedules will be evaluated by the HSR at the time of the respiratory hazard assessment. The Respiratory Hazard Assessment, Form RP-2, will describe the information and data used as the basis for the cartridge change-out schedule and the proposed change schedule.

Approved respirators for protection against particulate contaminants can include the following:

- An atmosphere supplying respirator

- A respirator equipped with a filter certified by NIOSH under 32 CFR Part 11 or 42 CFR Part 84 as a P100 filter (formerly known as a high-efficiency particulate [HEPA] air filter)

A full- or half-face, air-purifying respirator equipped with NIOSH-approved cartridges or filters will be selected to protect against vapors, gases, and aerosols for any tasks performed in Level C PPE. In addition, dust masks will be used when particulate levels exceed the action levels specified in Table 8-1 and Attachment 1.

Air-purifying respirators will be used only in conjunction with breathing-space air monitoring, which must be conducted in adherence to the action levels outlined in Table 8-1. Air-purifying respirators will be used only when they can provide protection against the substances encountered on site.

Factors that would preclude use of Level C and air-purifying respirators are as follows:

- Oxygen-deficient atmosphere (less than 19.5 percent oxygen)
- Concentrations of substances that may be immediately dangerous to life and health
- Confined or unventilated areas that may contain airborne contaminants not yet characterized
- Unknown contaminant concentrations or concentrations that may exceed the maximum use levels for designated cartridges documented in the selected cartridge manufacturer's instructions
- Unidentified contaminants
- High relative humidity (more than 85 percent, which reduces the sorbent life of the cartridges)
- Respirator cartridges with an undetermined service life

Use, cleaning, and maintaining respirators are described in SWP 6-27, Respirator Cleaning Procedures, and SWP 6-28, Safe Work Practices for Use of Respirators. These SWPs are included in Appendix B.

7.0 MEDICAL SURVEILLANCE

The following sections describe SulTRAC's medical surveillance program, including health monitoring requirements, site-specific medical monitoring, and medical support and follow-up requirements.

Procedures documented in these sections will be followed for all activities at the Celotex site. Additional requirements are defined in the SulTRAC, Inc., "Health and Safety Manual."

7.1 HEALTH MONITORING REQUIREMENTS

All SulTRAC and subcontractor personnel involved in on-site activities at the Celotex site must participate in a health monitoring program as required by 29 CFR 1910.120(f). SulTRAC has established a health monitoring program with WorkCare, Inc., of Orange, California. Under this program, SulTRAC personnel receive baseline and annual or biennial physical examinations consisting of the following:

- Complete medical and work history
- Physical examination
- Vision screening
- Audiometric screening
- Pulmonary function test
- Resting electrocardiogram
- Chest X-ray (required once every 3 years)
- Blood chemistry, including hematology and serum
- Urinalysis

SulTRAC receives a copy of the examining physician's written opinion for each employee after post-examination laboratory tests have been completed; the SulTRAC employee also receives a copy of the written opinion. This opinion includes the following information (in accordance with 29 CFR 1910.120[f][7]):

- The results of the medical examination and tests
- The physician's opinion as to whether the employee has any medical conditions that would place the employee at an increased risk of health impairment from work involving hazardous waste operations or during an emergency response
- The physician's recommended limitations, if any, on the employee's assigned work; special emphasis is placed on fitness for duty, including the ability to wear any required PPE under conditions expected on site (for example, temperature extremes)

- A statement that the employee has been informed by the physician of the medical examination results and of any medical conditions that require further examination or treatment

All subcontractors must maintain health monitoring programs conducted by their own clinics in compliance with 29 CFR 1910.120(f). Any visitor or observer at the site will be required to provide records in compliance with 29 CFR 1910.120(f) before entering the site.

7.2 SITE-SPECIFIC MEDICAL MONITORING

There are no site-specific medical monitoring requirements for the site. SulTRAC is conducting oversight of the work which is being performed by the PRP contractor in accordance with their HASP.

7.3 MEDICAL SUPPORT AND FOLLOW-UP REQUIREMENTS

As a follow-up to an injury that requires care beyond basic first aid or to possible exposure above established exposure limits, all employees are entitled to and encouraged to seek medical attention and physical testing. These injuries and exposures must be reported to the HSR. Depending on the type of injury or exposure, follow-up testing, if required, must be administered within 24 to 48 hours of the incident. It will be the responsibility of the employer's medical consultant to advise the type of test required to accurately monitor for exposure effects. The SulTRAC SSC must complete the Tetra Tech Incident Report (Form IR in Appendix A) in the event of an accident, illness, or injury. A copy of this form must be forwarded to the HSR for use in determining the recordability of the incident and for inclusion in SulTRAC's medical surveillance records.

8.0 ENVIRONMENTAL MONITORING AND SAMPLING

Environmental monitoring or sampling will be conducted to assess personnel exposure levels as well as site or ambient conditions and to determine appropriate levels of PPE for work tasks. The following sections discuss initial and background air monitoring, personal monitoring, ambient air monitoring, monitoring parameters and devices, use and maintenance of survey equipment, thermal stress monitoring, and noise monitoring. Site-specific air monitoring requirements and action levels are provided in Table 8-1.

8.1 INITIAL AND BACKGROUND AIR MONITORING

Initial air monitoring of the work area will be performed by the remediation contractor before a work task begins. This monitoring will use real-time field survey instrumentation. Air will also be monitored at the beginning of each workday to identify any potentially hazardous situation that might have developed during off-shift periods.

Operations at the site may result in variable background levels of airborne compounds. Airborne compounds may be released from vehicles, blowing dust, material transfers, and so on. These sources can complicate evaluation of contaminant emissions during project tasks. Therefore, several upwind and pre-work measurements will be taken to assess contributions to airborne contamination by other potential sources.

8.2 PERSONAL MONITORING

The employees working closest to a source of contamination have the highest likelihood of exposure to airborne contaminant concentrations that may exceed established exposure limits. Therefore, the remediation contractor on-site (CH2MHill) will conduct selective monitoring of the workers who are closest to a source of contaminant generation during site activities. Personal monitoring will be conducted in the breathing zone and, if a worker is wearing respiratory protective equipment, outside the face piece.

TABLE 8-1

SITE-SPECIFIC AIR MONITORING REQUIREMENTS AND ACTION LEVELS

Air monitoring will be conducted by the remediation contractor. However if the remediation contractor's data are not available, SulTRAC will implement the following default program.

Contaminant or Hazard	Task	Monitoring Device	Action Level	Monitoring Frequency	Action ^a
Organic vapors	Oversight	*FID PID	*Background to 5 ppm	*Every 30 to 60 minutes	*Use Level D PPE
			*5 to 100 ppm	*Every 30 minutes	*Use Level C PPE (unless specific chemicals are identified and evaluated using detector tube)
			*> 100 ppm	*NA	*Stop work and evacuate area; implement vapor suppression controls
Particulates	Oversight	*Particulate monitor	*<2.5 mg/m ³	*Hourly or more frequent, as determined by SSC	*Use Level D PPE
			*2.5 to 5 mg/m ³	*Hourly or more frequent, as determined by SSC	*Use Level D PPE plus a dust mask
			*5 to 10 mg/m ³	*Continuous	*Use Level C PPE and implement dust suppression measures
			*>10 mg/m ³	*NA	*Stop work and implement dust suppression activities
Noise	Oversight	*Sound level meter	*≥85 dBA	*When necessary	*Use hearing protection

Notes

dBA Decibel as measured on the A-weighted scale
 FID Flame ionization detector
 mg/m³ Milligram per cubic meter
 NA Not applicable
 PID Photoionization detector
 PPE Personal protective equipment

TABLE 8-1 (Continued)

SITE-SPECIFIC AIR MONITORING REQUIREMENTS AND ACTION LEVELS

ppm Part per million

SSC Site Safety Coordinator

^a Refer to Table 4-2 for specific types of gloves, chemical resistant clothing, respirators, and cartridges.

Action levels in this table are from EPA's "Standard Operating Safety Guide" dated June 1992.

8.3 AMBIENT AIR MONITORING

Most tasks will require monitoring the general work area or ambient site conditions. Ambient monitoring will generally be conducted using direct-reading survey instrumentation or compound-specific instruments or detector tubes.

Initial ambient air monitoring will be performed as a minimum requirement when any of the situations listed below arise.

- Work begins on a different portion of the site.
- Contaminants other than those previously identified are encountered.
- A different type of operation is initiated (for example, well installation is initiated after drilling activities).
- Workers handle leaking containers or work in areas with obvious liquid contamination (for example, spill or lagoon areas).
- Obvious lithologic changes are noticed during drilling.
- Workers experience physical difficulties.

Periodic ambient air monitoring will be performed at the frequency listed in Table 8-1.

8.4 MONITORING PARAMETERS AND DEVICES

The following sections below briefly describe the use and limitations of instruments used to monitor for organic vapors and particulates. Site-specific air monitoring requirements and action levels are listed in Table 8-1.

All monitors will be calibrated in accordance with manufacturer recommendations at the beginning of every workday, if possible. Calibration results along with air monitoring data will be recorded in the field logbook.

8.4.1 Organic Vapors

A direct-reading organic vapor monitor, such as a flame ionization detector (FID) or photoionization detector (PID), will be used to assess the presence of volatile organic compounds (VOC). Table 8-1

specifies the instrument that will be used for the project. The concentrations of individual VOCs of concern cannot usually be identified using the instrument because the detector responds to the total VOC mixture.

8.4.2 Particulates

Aerosols are a group of airborne materials that include particulates, fumes, mists, and smoke. Particulates are the primary aerosol of concern at hazardous waste sites. If climatic conditions, surface soil conditions, or site operations (such as excavation) impair ambient air quality by increasing levels of particulate matter for extended periods of time, air monitoring using a direct-reading instrument for particulates may become necessary. If elevated (visible) particulate matter conditions persist for 5 minutes or longer, the remediation contractor is responsible for sampling the breathing zone with a particulate monitor.

Generally, particulate monitors are capable of measuring both solid and liquid particulates within the size range of 0.1 to 10 micrometers (the respirable range). A monitor indicates the concentration of these particulates in units of milligrams per cubic meter of air.

Action levels for particulates will be based on the type of dust and hazardous materials that may contribute to the composition of the particulates and will be determined with the assistance of the SulTRAC HSR or designee. Table 8-1 lists the monitoring device, monitoring frequency, and general action levels expected to be used during site activities.

8.5 USE AND MAINTENANCE OF SURVEY EQUIPMENT

Survey equipment will be used and maintained by the PRP contractor. All personnel using field survey equipment must have training in its operation, limitations, and maintenance. Maintenance and internal or electronic calibration will be performed in accordance with manufacturer recommendations by individuals familiar with the devices before they are used on site. Repairs, maintenance, and internal or electronic calibration of these devices will be recorded in an equipment maintenance logbook. The equipment maintenance logbook for each instrument will be kept in that instrument's case. Rented monitoring equipment will be repaired and maintained by the rental company. Results of routine calibration will be recorded in the field logbook.

Air monitoring equipment (such as combustible gas indicators, oxygen meters, and PIDs) will be calibrated before work begins. Only basic maintenance (such as changing batteries) will be performed by on-site personnel. Any additional maintenance or repairs will be performed by a trained service technician.

8.6 THERMAL STRESS MONITORING

Heat stress and cold stress are common and serious threats at hazardous waste sites. SWPs 6-15 and 6-16 discuss heat and cold stress and include monitoring methods appropriate for the season and location of work (see Appendix B).

8.7 NOISE MONITORING

In most cases, high noise levels at a work site are caused by heavy equipment, such as drill rigs and backhoes, or by sources associated with the work site, such as factory equipment and vehicles. When noise levels at the Celotex site are suspected to equal or exceed an 8-hour time-weighted average (TWA) of 85 decibels on an A-weighted scale in slow-response mode (85 dBA), the SulTRAC SSC will evaluate the work area to characterize the noise source and exposure levels. A sound level meter may be used for the evaluation, but a noise dosimeter is recommended for documenting full-shift noise exposures. If neither instrument is available, the SSC may use a simple rule-of-thumb test to decide whether noise levels exceed 85 dBA. The test requires the SSC to determine how loud he or she must speak to be heard at an arm's length from another person. If the SSC must raise his or her voice to be heard, the average noise level likely exceeds 85 dBA.

Hearing protection must be worn if employees are exposed to noise levels that exceed the action level of 85 dBA. The protectors will be earplugs or muffs that must provide sufficient attenuation to limit noise exposure to less than 85 dBA. The SSC will supervise use of hearing protectors at the work site as necessary. Table 8-1 lists the monitoring device and action levels to be used.

9.0 SITE CONTROL

Site control is an essential component in HASP implementation. The following sections discuss measures and procedures for site control, such as on-site communications, site control zones, site access control, site safety inspections, and SWPs.

9.1 ON-SITE COMMUNICATIONS

Successful communication between field teams and personnel in the support zone is essential. Cellular telephones will be available during site activities.

The hand signals listed below will be used by site personnel in emergencies or when verbal communication is difficult.

Signal	Definition
Hands clutching throat	Out of air or cannot breathe
Hands on top of head	Need assistance
Thumbs up	Okay, I am all right, or I understand
Thumbs down	No or negative
Arms waving upright	Send backup support
Gripping partner's wrist	Exit area immediately

9.2 SITE CONTROL ZONES

On-site work areas may be divided into an exclusion zone, a decontamination zone, and a support zone to control the spread of contamination and employee exposures to chemical and physical hazards. Access to the exclusion and decontamination zones will be restricted to authorized personnel. Any visitors to these areas must present proper identification and be authorized to be on site. The remediation contractor will identify work areas that visitors or personnel are authorized to enter and will enforce site control measures.

The following sections describe the exclusion zone, the decontamination zone, and the support zone as well as procedures to be followed in each.

9.2.1 Zone 1: Exclusion Zone

The PRP contractor will establish the exclusion zone. An exclusion zone includes areas where contamination is either known or is likely to be present or, because of work activity, has the potential to cause harm to personnel. The perimeter of the exclusion zone and an appropriate radius around work

areas will be demarcated by a physical barrier, such as barricade tape or traffic cones, to restrict access. A daily roster with the date of each person's entrance into the exclusion zone; the person's name, signature, and organization; and the time of entry and exit will be kept for all personnel working in the zone. Visitors will not be permitted to enter the exclusion zone without proper qualifications, equipment, and remediation contractor authorization. Work tasks that may require establishment of an exclusion zone include the following:

- Oversight of contaminated soil excavation
- Oversight of cap installation

9.2.2 Zone 2: Decontamination Zone

The PRP contractor will establish a decontamination zone. The decontamination zone will contain facilities to decontaminate personnel and portable equipment. A steam-cleaning area for decontamination of heavy equipment and vehicles may be established at a location readily accessible from work areas. Equipment decontamination procedures are described in Section 10.0. Visitors will not be permitted to enter the decontamination zone without proper qualifications and remediation contractor authorization.

9.2.3 Zone 3: Support Zone

A support zone may consist of any uncontaminated and nonhazardous part of the site. The support zone should be situated in an area generally upwind of any exclusion zone whenever possible. Site visitors who do not meet training, medical surveillance, and PPE requirements must stay in the support zone.

9.3 SITE ACCESS CONTROL

The Celotex Main Site is bordered to the north by 27th Street and to the east by Sacramento and Whipple Avenues. The site is bordered on the west by Albany Street, with residences located across the street. The Chicago Sanitary and Ship Canal is located about 1,500 feet to the south. The nearest residences are located less than 200 feet from the site. Access to the site is controlled by security personnel, gates, and fences. Access to the residential properties will be controlled in accordance with Section 8.0 of the PRP HASP.

9.4 SITE SAFETY INSPECTIONS

The SulTRAC SSC will conduct periodic site safety inspections once a month for every month that field oversight work is occurring to ensure safe work areas and compliance with this HASP. Results of the site safety inspections will be recorded in the field logbook or on a Field Audit Checklist (Form AF-1 in Appendix A). The results of these audits will be sent to the SulTRAC HSR and placed in the project file.

9.5 SAFE WORK PRACTICES

Various SWPs apply to the Celotex site. These SWPs are included in Appendix B to this HASP. The following SWPs apply to the site:

- SWP 6-1, General Safe Work Practices
- SWP 6-04 Excavation Work
- SWP 6-15, Heat Stress
- SWP 6-16, Cold Stress
- SWP 6-17 Biohazards
- SWP 6-26 Working Near Heavy Equipment

As stated in SWP 6-1 in Appendix B, eating, drinking or smoking in the exclusion zone is prohibited and the buddy system should always be used.

10.0 DECONTAMINATION

Decontamination is the process of removing or neutralizing contaminants on personnel or equipment. When properly conducted, decontamination procedures protect workers from contaminants that may have accumulated on PPE, tools, and other equipment. Proper decontamination also prevents transport of potentially harmful materials to uncontaminated areas. Personnel and equipment decontamination procedures are described in the following sections.

10.1 PERSONNEL DECONTAMINATION

Personnel decontamination at the site will be limited by using disposable PPE whenever possible. Any personnel decontamination procedures will follow guidance in the *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities* (NIOSH and others 1985). Personnel and PPE will be decontaminated with potable water or a mixture of detergent and water. Liquid and solid wastes generated during decontamination will be collected and drummed.

The decontamination procedures listed below will be conducted if personnel decontamination is required.

- Wash neoprene boots or disposable booties with a Liquinox or Alconox solution and rinse them with water. Remove and retain neoprene boots for reuse, if possible. Place disposable booties in plastic bags for disposal.
- Wash outer gloves in a Liquinox or Alconox solution and rinse them in water. Remove outer gloves and place them in a plastic bag for disposal.
- Remove chemical-resistant clothing and place it in a plastic bag for disposal.
- Remove the air-purifying respirator, if used, and place the spent filter in a plastic bag for disposal. The filter must be changed in accordance with the Respiratory Hazard Assessment form (Form RP-2 in Appendix C). Clean and disinfect the respirator in accordance with SWP 6-27 and place it in a plastic bag for storage.
- Remove inner gloves and place them in a plastic bag for disposal.
- Thoroughly wash the hands and face with water and soap.

Used, disposable PPE will be collected in sealable containers and will be disposed of in accordance with the procedures described in Section 6.3 of the PRP HASP. Personnel decontamination procedures may be modified as necessary while the field crew is on site.

10.2 EQUIPMENT DECONTAMINATION

All drilling, sampling, and field monitoring equipment used during site activities will be decontaminated by the PRP contractor. Decontamination of on-site heavy equipment and sampling equipment will follow procedures defined in the site's work plan prepared by the PRP contractor and approved by EPA Region 5.

10.2.1 Heavy Equipment

The PRP contractor will decontaminated heavy equipment, such as drilling and excavating vehicles, in accordance with the site work plan prepared by the PRP contractor and approved by EPA Region 5

10.2.2 Sampling Equipment

The PRP contractor will decontaminated sampling equipment, such as split spoons, before and after each use as described below in accordance with the site work plan prepared by the PRP contractor and approved by EPA Region 5

11.0 EMERGENCY RESPONSE PLANNING

This section describes emergency response planning procedures to be implemented for the site. This section is consistent with local, state, and federal disaster and emergency management plans. The following sections discuss pre-emergency planning, personnel roles and lines of authority, emergency recognition and prevention, evacuation routes and procedures, emergency contacts and notifications, hospital route directions, emergency medical treatment procedures, protective equipment failure, fire or explosion, weather-related emergencies, spills or leaks, emergency equipment and facilities, and reporting.

11.1 PRE-EMERGENCY PLANNING

All on-site employees will be trained in and reminded of the provisions of Section 11.0, site communication systems, and site evacuation routes during the pre-work briefing and daily tailgate safety meetings. The emergency response provisions will be reviewed on a regular basis by the SulTRAC SSC and will be revised, if necessary, to ensure that they are adequate and consistent with prevailing site conditions.

11.2 PERSONNEL ROLES AND LINES OF AUTHORITY

The SulTRAC SSC has primary responsibility for responding to and correcting emergencies and for taking appropriate measures to ensure the safety of site personnel and the public. Possible actions may include evacuation of personnel from the site area. The SSC is also responsible for ensuring that

corrective measures have been implemented, appropriate authorities have been notified, and follow-up reports have been completed.

Individual subcontractors are required to cooperate with the SSC, within the parameters of their scopes of work.

Personnel are required to report all injuries, illnesses, spills, fires, and property damage to the SSC. The SSC must be notified of any on-site emergencies and is responsible for ensuring that the appropriate emergency procedures described in this section are followed. The local fire or emergency response department will be supplied with a copy of this HASP before site work begins.

11.3 EMERGENCY RECOGNITION AND PREVENTION

Table 4-1 lists potential on-site chemical hazards, and Table 4-2 provides information on the hazards associated with the different tasks planned for the site. On-site personnel will be made familiar with this information and with techniques of hazard recognition through pre-work training and site-specific briefings.

11.4 EVACUATION ROUTES AND PROCEDURES

In the event of an emergency that necessitates evacuation of a work task area or the site, the SulTRAC SSC will contact all nearby personnel using the on-site communications discussed in Section 9.1 to advise the personnel of the emergency. The personnel will proceed along site roads to a safe distance upwind from the hazard source. The personnel will remain in that area until the SSC or an authorized individual provides further instructions.

11.5 EMERGENCY CONTACTS AND NOTIFICATIONS

The emergency information before Section 1.0 of this HASP provides names and telephone numbers of emergency contact personnel. **THIS PAGE MUST BE POSTED ON SITE OR MUST BE READILY AVAILABLE AT ALL TIMES.** In the event of a medical emergency, personnel will notify the emergency organization and will take direction from the SulTRAC SSC. In the event of a fire, explosion, or spill at the site, the SSC will notify the appropriate local, state, and federal agencies and will follow the procedures discussed in Section 11.9 or 11.11.

11.6 HOSPITAL ROUTE DIRECTIONS

Before site activities begin, SulTRAC personnel will conduct a pre-emergency hospital run to familiarize themselves with the route to the local hospital. A map that shows the hospital route is provided in the emergency information before Section 1.0 of this HASP.

11.7 EMERGENCY MEDICAL TREATMENT PROCEDURES

A person who becomes ill or injured during work may require decontamination. If the illness or injury is minor, any decontamination necessary will be completed and first aid should be administered before the patient is transported. If the patient's condition is serious, partial decontamination will be completed (such as complete disrobing of the person and redressing in the person in clean coveralls or wrapping in a blanket). First aid should be administered until an ambulance or paramedics arrive. All injuries and illnesses must be reported immediately to the SulTRAC project manager and HSR.

Any person transported to a clinic or hospital for treatment of chemical exposure will be accompanied by information on the chemical he or she has been exposed to at the site, if possible. Table 4-1 contains this information.

11.8 PROTECTIVE EQUIPMENT FAILURE

If any worker in the exclusion zone experiences a failure of protective equipment (either engineering controls or PPE) that affects his or her personal protection, the worker and all coworkers will immediately leave the exclusion zone. Re-entry to the exclusion zone will not be permitted until (1) the protective equipment has been repaired or replaced, (2) the cause of the equipment failure has been determined, and (3) the equipment failure is no longer considered a threat.

11.9 FIRE OR EXPLOSION

The local fire department will be immediately summoned in the event of a fire or explosion on site. The SulTRAC SSC or a site representative will advise the fire department of the location and nature of any hazardous materials involved. Site personnel will implement appropriate provisions of Section 11.0.

11.10 WEATHER-RELATED EMERGENCIES

Site work shall not be conducted during severe weather conditions, including high-speed winds or lightning. In the event of severe weather, field personnel will stop work, secure and lower all equipment (for example, drilling masts), and leave the site.

Thermal stress caused by excessive heat or cold may occur as a result of extreme temperatures, workload, or the PPE used. Heat and cold stress treatment will be administered as described in SWPs 6-15 and 6-16.

11.11 SPILLS OR LEAKS

In the event of a severe spill or a leak, site personnel will follow the procedures listed below.

- Evacuate the affected area and relocate personnel to an upwind location.
- Inform the SulTRAC SSC, a SulTRAC office, and a site representative immediately.
- Locate the source of the spill or leak, and stop the flow if it is safe to do so.
- Begin containment and recovery of spilled or leaked materials.
- Notify appropriate local, state, and federal agencies.

Additional information on spill and leak control is presented in SWP 6-14.

11.12 EMERGENCY EQUIPMENT AND FACILITIES

The following emergency equipment will be available on site:

- First aid kit
- Mobile telephone
- Additional equipment such as a portable eyewash and fire extinguisher are maintained on site by the PRP contractor CH2M Hill who is performing the removal action.

11.13

REPORTING

All emergencies require follow-up and reporting. Appendix A includes the SulTRAC Incident Report (Form IR). Any incident that occurs on site must be reported to the project manager, SSC, and SulTRAC HSR immediately via telephone. A copy of Form IR must be completed and submitted to the SulTRAC HSR within 24 hours of an emergency. Before the report is submitted to the HSR, the project manager will review and sign the report. The report must include proposed actions to prevent similar incidents from occurring. The HSR must be fully informed of the corrective action process so that she may implement applicable elements of the process at other sites.

REFERENCES

- American Conference of Governmental Industrial Hygienists (ACGIH). 1998. "Threshold Limit Values and Biological Exposure Indices for 1998." Latest edition.
- National Institute for Occupational Safety and Health (NIOSH) and others. 1985. *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*. October.
- NIOSH. 1997. "Pocket Guide to Chemical Hazards." U.S. Department of Health and Human Services. U.S. Government Printing Office. Washington, DC. June.
- Tetra Tech Inc. 1999. "Health and Safety Manual."
- CH2MHILL. 2007. "Final Main Site Evaluation Report."

APPENDIX A

SULTRAC FORMS

(Eight Sheets)

- Compliance Agreement (Form HSP-4)
- Daily Tailgate Safety Meeting (Form HST-2)
- Daily Site Log (Form SSC-1)
- Accident and Illness Investigation Report (Form IR)
- Field Audit Checklist (Form AF-1)



TETRA TECH, INC.
DAILY TAILGATE SAFETY MEETING FORM

Date: _____ Time: _____ Project No.: _____

Client: _____ Site Location: _____

Site Activities Planned for Today: _____

Safety Topics Discussed
Protective clothing and equipment:
Chemical hazards:
Physical hazards:
Environmental and biohazards:
Equipment hazards:
Decontamination procedures:
Other:
Review of emergency procedures:
Employee Questions or Comments:



TETRA TECH, INC.

DAILY TAILGATE SAFETY MEETING FORM (Continued)

Attendees	
Printed Name	Signature

Meeting Conducted by:

Name

Title

Signature



TETRA TECH, INC.
DAILY SITE LOG

Site Name: _____ Date: _____

Name (print)	Company	Time	
		In	Out

Comments:



TETRA TECH, INC.
FIELD AUDIT CHECKLIST

Project Name: _____ Project No.: _____

Field Location: _____ Completed by: _____

Project Manager: _____ Site Safety Coordinator: _____

General Items		In Compliance?		
Health and Safety Plan Requirements		Yes	No	NA
1	Approved health and safety plan (HASP) on site or available			
2	Names of on-site personnel recorded in field logbook or daily log			
3	HASP compliance agreement form signed by all on-site personnel			
4	Material Safety Data Sheets on site or available			
5	Designated site safety coordinator present			
6	Daily tailgate safety meetings conducted and documented			
7	On-site personnel meet HASP requirements for medical examinations, fit testing, and training (including subcontractors)			
8	Compliance with specified safe work practices			
9	Documentation of training, medical examinations, and fit tests available from employer			
10	Exclusion, decontamination, and support zones delineated and enforced			
11	Windsock or ribbons in place to indicate wind direction			
12	Illness and injury prevention program reports completed (California only)			
Emergency Planning				
13	Emergency telephone numbers posted			
14	Emergency route to hospital posted			
15	Local emergency providers notified of site activities			
16	Adequate safety equipment inventory available			
17	First aid provider and supplies available			
18	Eyewash stations in place			
Air Monitoring				
19	Monitoring equipment specified in HASP available and in working order			
20	Monitoring equipment calibrated and calibration records available			
21	Personnel know how to operate monitoring equipment and equipment manuals available on site			
23	Environmental and personnel monitoring performed as specified in HASP			



TETRA TECH, INC.
FIELD AUDIT CHECKLIST (Continued)

Safety Items		In Compliance?		
Personal Protection		Yes	No	NA
1	Splash suit			
2	Chemical protective clothing			
3	Safety glasses or goggles			
4	Gloves			
5	Overboots			
6	Hard hat			
7	Dust mask			
8	Hearing protection			
9	Respirator			
Instrumentation				
10	Combustible gas meter			
11	Oxygen meter			
12	Organic vapor analyzer			
Supplies				
13	Decontamination equipment and supplies			
14	Fire extinguishers			
15	Spill cleanup supplies			
Corrective Action Taken During Audit:				
Corrective Action Still Needed:				

Note: NA = Not applicable

Auditor's Signature

Site Safety Coordinator's Signature

Date



Report Date	Report Prepared By	Incident Report Number
INSTRUCTIONS: All incidents (including those involving subcontractors under direct supervision of Tetra Tech personnel) must be documented on the IR Form. Complete any additional parts to this form as indicated below for the type of incident selected.		
TYPE OF INCIDENT (Check all that apply)		Additional Form(s) Required for this type of incident
Near Miss (No losses, but could have resulted in injury, illness, or damage)	<input type="checkbox"/>	Complete IR Form Only
Injury or Illness	<input type="checkbox"/>	Complete Form IR-A; Injury or Illness
Property or Equipment Damage, Fire, Spill or Release	<input type="checkbox"/>	Complete Form IR-B; Damage, Fire, Spill or Release
Motor Vehicle	<input type="checkbox"/>	Complete Form IR-C; Motor Vehicle
INFORMATION ABOUT THE INCIDENT		
Description of Incident 		
Date of Incident	Time of Incident _____ AM <input type="checkbox"/> PM <input type="checkbox"/> OR Cannot be determined <input type="checkbox"/>	
Weather conditions at the time of the incident	Was there adequate lighting? _____ Yes <input type="checkbox"/> No <input type="checkbox"/>	
Location of Incident _____ Was location of incident within the employer's work environment? Yes <input type="checkbox"/> No <input type="checkbox"/>		
Street Address	City, State, Zip Code and Country	
Project Name	Client:	
Tt Supervisor or Project Manager	Was supervisor on the scene? Yes <input type="checkbox"/> No <input type="checkbox"/>	
WITNESS INFORMATION (attach additional sheets if necessary)		
Name	Company	
Street Address	City, State and Zip Code	
Telephone Number(s)		

**CORRECTIVE ACTIONS**

Corrective action(s) immediately taken by unit reporting the incident:

Corrective action(s) still to be taken (by whom and when):

ROOT CAUSE ANALYSIS LEVEL REQUIREDRoot Cause Analysis Level Required: Level - 1 ☐ Level - 2 ☐ None ☐**Root Cause Analysis Level Definitions****Level - 1**

Definition: A Level 1 RCA is conducted by an individual(s) with experience or training in root cause analysis techniques and will conduct or direct documentation reviews, site investigation, witness and affected employee interviews, and identify corrective actions. Activating a Level 1 RCA and identifying RCA team members will be at the discretion of the Corporate Administration office.

The following events may trigger a Level 1 RCA:

- Work related fatality
- Hospitalization of one or more employee where injuries result in total or partial permanent disability
- Property damage in excess of \$75,000
- When requested by senior management

Level - 2

Definition: A Level 2 RCA is self performed within the operating unit by supervisory personnel with assistance of the operating unit HSR. Level 2 RCA will utilize the 5 Why RCA methodology and document the findings on the tools provided.

The following events will require a Level 2 RCA:

- OSHA recordable lost time incident
- Near miss incident that could have triggered a Level 1 RCA
- When requested by senior management

Complete the Root Cause Analysis Worksheet and Corrective Action form. Identify a corrective action(s) for each root cause identified within each area of inquiry.

NOTIFICATIONS

Title	Printed Name	Signature	Telephone Number	Date
Project Manager or Supervisor				
Site Safety Coordinator or Office H&S Representative				
Operating Unit H&S Representative				
Other: _____				

The signatures provided above indicate that appropriate personnel have been notified of the incident.

APPENDIX B

SAFE WORK PRACTICES

(30 Sheets)

- SWP 6-1 General Safe Work Practices
- *SWP 6-4 Excavation Practices
- *SWP 6-15 Heat Stress
- *SWP 6-16 Cold Stress
- *SWP 6-17 Biohazards
- *SWP 6-26 Use of Heavy Equipment



TETRA TECH, INC.
HEALTH AND SAFETY MANUAL
VOLUME III

SAFE WORK PRACTICES (SWP)

GENERAL SAFE WORK PRACTICES

SWP NO.: 6-1
ISSUE DATE: JULY 1998
REVISION NO.: 1

Disclaimer: This safe work practice (SWP) is the property of Tetra Tech, Inc. (Tetra Tech), and its subsidiaries. Any reuse of the SWP without Tetra Tech's permission is at the sole risk of the user. The user will hold harmless Tetra Tech for any damages that result from unauthorized reuse of this SWP. Authorized users are responsible for obtaining proper training and qualification from their employer before performing operations described in this SWP.

swp6-01_general_safe_work_practices

GENERAL SAFE WORK PRACTICES

To prevent injuries and adverse health effects, the following general safe work practices (SWP) are to be followed when conducting work involving known and unknown site hazards. These SWPs establish a pattern of general precautions and measures for reducing risks associated with hazardous site operations. This list is not inclusive and may be amended as necessary.

- Do not eat, drink, chew gum or tobacco, take medication, or smoke in contaminated or potentially contaminated areas or where the possibility for the transfer of contamination exists.
- Wash hands and face thoroughly upon leaving a contaminated or suspected contaminated area. A thorough shower and washing must be conducted as soon as possible if excessive skin contamination occurs.
- Avoid contact with potentially contaminated substances. Do not walk through puddles, pools, mud, or other such areas. Avoid, whenever possible, kneeling on the ground or leaning or sitting on drums, equipment, or the ground. Do not place monitoring equipment on potentially contaminated surfaces.
- Remove beards or facial hair that interfere with a satisfactory qualitative respirator fit test or routine pre-entry positive and negative pressure checks.
- Be familiar with and knowledgeable of and adhere to all instructions in the site-specific health and safety plan (HASP). At a minimum, a safety meeting will be held at the start of each project to discuss the HASP. Additional meetings will be held, as necessary, to address new or continuing safety and health concerns.
- Be aware of the location of the nearest telephone and all emergency telephone numbers.
- Attend a briefing on the anticipated hazards, equipment requirements, SWPs, emergency procedures, and communication methods before going on site.
- Plan and delineate entrance, exit, and emergency escape routes.
- Rehearse unfamiliar operations prior to implementation.
- Use the "buddy system" whenever respiratory protection equipment is in use. Buddies should establish hand signals or other means of emergency communication in case radios break down or are unavailable.
- Buddies should maintain visual contact with each other and with other on-site team members by remaining in close proximity in order to assist each other in case of emergency.

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- Minimize the number of personnel and equipment in contaminated areas (such as the exclusion zone). Nonessential vehicles and equipment should remain within the support zone.
- Establish appropriate support, contamination reduction, and exclusion zones.
- Establish appropriate decontamination procedures for leaving the site.
- Immediately report all injuries, illnesses, and unsafe conditions, practices, and equipment to the site safety coordinator (SSC).
- Maintain a portion of the site field logbook as a project safety log. The project safety log will be used to record the names, entry and exit dates, and times on site of all Tetra Tech, subcontractor, and project site visitor personnel; air quality and personal exposure monitoring data; and other information related to safety matters. Form SSC-1, Daily Site Log, may be used to record names of on-site personnel.
- A portable eyewash station should be located in the support zone if chemical splashes to eyes are possible.
- Do not bring matches and lighters in the exclusion zone or contamination reduction zone.
- Observe coworkers for signs of toxic exposure and heat or cold stress.
- Inform coworkers of nonvisual effects of illness if you experience them, such as headaches, dizziness, nausea, or blurred vision.

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TETRA TECH, INC.
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SAFE WORK PRACTICES (SWP)

EXCAVATION PRACTICES

SWP NO.: 6-4

ISSUE DATE: JULY 1998

REVISION NO.: 1

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swp6-04_excavation_practices

EXCAVATION PRACTICES

This safe work practice (SWP) outlines minimum requirements to protect employees who may be exposed to hazards during trenching and excavation activities and to provide general guidance for compliance with Title 29 of the *Code of Federal Regulations* (CFR), Part 1926, Subpart P, "Excavations."

Project managers shall ensure that all excavation, shoring, and trenching activities are conducted in accordance with the requirements outlined in this document and Subpart P of 29 CFR 1926. Project managers must also ensure that projects involving trenching and excavation are staffed by an individual capable of performing "competent person" duties as described in this procedure.

The site safety coordinator (SSC) is responsible for on-site enforcement of this SWP.

Definitions and procedures used for excavations are discussed below.

1.0 DEFINITIONS

The following definitions apply to this SWP:

Benching: Forming one or a series of horizontal levels or steps in the sides of an excavation to protect employees from cave-ins

Competent Person: One capable of identifying existing or predictable hazards in the work environment that are unsanitary or dangerous to employees and who has authorization to take prompt corrective measures to eliminate the hazards

Excavation: Any manmade cut, cavity, trench, or depression in an earth surface formed by earth removal

Shoring: Metal, hydraulic, mechanical, or timber system that supports the sides of an excavation and that is designed to prevent cave-ins

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Sloping: Sloping the sides of an excavation at an incline away from the excavation to protect employees from cave-ins

Trench: A narrow excavation (in relation to its length) that is usually deeper than it is wide but less than 15 feet wide

2.0 PROCEDURES

Described below are the general safety requirements and protective system requirements for trenching and excavation activities.

2.1 GENERAL SAFETY REQUIREMENTS

General safety requirements that must be in place before work begins are as follows:

- Utility companies or a utilities locating service in the area must be notified **before excavation or trenching activities begin** to arrange for locating and protecting underground utilities.
- Access to trenching areas must be controlled and limited to authorized personnel. Prior to entering a trench or excavation, workers must notify the project manager, SSC, and nearby equipment operators whose activities could affect the trench or excavation.
- No person may enter a trench or work at the foot of the face of an excavation until a qualified, competent person has inspected the excavation and determined whether sloping or shoring is required to protect against cave-in or subsidence and the appropriate protection has subsequently been installed.
- Trenches and excavations must be assessed by a qualified, competent person, even in the absence of working personnel, whenever heavy equipment will be operating nearby in order to ensure that the trench or excavation will support the weight of the equipment without subsidence or causing the accidental overturning of machinery.
- Trenches and excavations must be inspected regularly (daily at a minimum) to ensure that changes in temperature, precipitation, shallow groundwater, overburden, nearby building weight, vibration, or nearby equipment operation have not caused weakening of the sides, faces, and floors and to ensure that personnel protection is being maintained.
- When subsidence or tension cracks are apparent anywhere in an excavation, all work should be stopped until the problem is corrected.

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- The competent person must inspect trenches or excavations after any precipitation event to ensure integrity has been maintained.
- Sufficient ramps or ladders must be provided in excavations 4 or more feet deep to allow quick egress. Ramps or ladders may be placed no more than 25 feet apart, must be secured from shifting, and must extend at least 3 feet above the top of the trench or excavation. Structural ramps must be designed by a competent person.
- Material removed from an excavation or trench must be placed far enough from the edge (at least 2 feet) to prevent it from sliding into the excavation or trench or from stressing the trench or excavation walls. Worker protection must also be provided from loose rock or soil on the excavation faces.
- If trenches or excavations are near walkways or roadways, guards or warning barriers must be placed to alert pedestrians and drivers of the presence of the trench or excavation.
- If possible, trenches or excavations should be covered or filled in when unattended. Otherwise, strong barriers must be placed around the trench or excavation and lighting must be provided at night if the trench or excavation is near a walkway or roadway.
- When a hazardous atmosphere could exist, the excavation must be tested for appropriate hazardous substances and oxygen level before personnel entry. Excavation where hazardous atmospheres exist must be treated as a confined space. Entry must follow procedures outlined in "Confined Space Entry Program," Document Control No. 2-5.
- Entry is not allowed into excavations where water has accumulated.

2.2 PROTECTIVE SYSTEM REQUIREMENTS

Protective systems protect employees from cave-ins, material that could fall in or roll off the face of the excavation, and collapse of adjacent structures. Protective systems include shoring, shielding, sloping and benching, and other systems. Sloping and benching and shoring system requirements are described below.

2.2.1 Sloping and Benching Requirements

Sloping and benching system construction must follow the guidelines established in Appendix B to Subpart P of 29 CFR 1926. Maximum allowable slopes for excavations are summarized below. All slopes indicated are expressed as the ratio of horizontal distance (H) to vertical rise (V).

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Soil or Rock Type	Maximum Allowable Slope (H:V) for Excavations Less than 20 Feet Deep
Stable Rock	Vertical (90°)
Type A	0.75:1 (53°)
Type B	1:1 (45°)
Type C	1.5:1 (34°)

Soil types are defined in Appendix A to Subpart P of 29 CFR 1926 and are summarized below.

- Type A: Cohesive soils with an unconfined compression strength of 1.5 tons per square foot (ton/ft²) or greater (such as clay, silty clay, sandy clay, or clay loam)
- Type B: Cohesive soils with an unconfined compression strength of greater than 0.5 but less than 1.5 ton/ft² (such as angular gravel, silt, silt loam, or sandy loam)
- Type C: Cohesive soils with an unconfined compression strength of less than 0.5 ton/ft² (such as gravel, sand, loamy sand, submerged soil, or unstable submerged rock)

Sloping and benching for excavations greater than 20 feet deep must be designed by a registered professional engineer.

Soil types must be determined by the competent person using at least one visual and one manual test. Manual tests include plasticity, dry strength, thumb penetration, and drying tests.

2.2.2 Shoring System Requirements

Appendixes C, D, and E to Subpart P of 29 CFR 1926 outline requirements for timber shoring for trenches, aluminum hydraulic shoring for trenches, and alternatives to timber shoring, respectively. Guidelines for shoring systems are listed below.

- If it is not economically feasible or there are space restrictions to prevent cutting the trench or excavation walls back to a safe angle of repose, all trenches or excavations 5 feet deep or more must be shored.
- Shoring should be erected as trenching or excavation progresses and as closely as possible to the excavation floor.

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- Shoring timber dimensions must meet the minimum timber requirements specified in Tables C1.1 through C1.3 of Appendix C to Subpart P 29 CFR 1926. Aluminum hydraulic shoring must be constructed using the guidelines and dimension requirements specified in Appendix D of the same standard.
- Trench shields may be used instead of shoring or bracing. Shields must be constructed of steel flat sides welded to a heavy framework of structural pipe. Shields should be moved along by the excavator as trenching or excavation proceeds.

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TETRA TECH, INC.
HEALTH AND SAFETY MANUAL
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SAFE WORK PRACTICES (SWP)

HEAT STRESS

SWP NO.: 6-15

ISSUE DATE: JULY 1998

REVISION NO.: 1

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swp6-15_heat_stress

HEAT STRESS

This safe work practice (SWP) describes situations where heat stress is likely to occur and provides procedures for the prevention and treatment of heat-related injuries and illnesses. Wearing personal protective equipment (PPE), especially during warm weather, puts employees at considerable risk of developing heat-related illness. Health effects from heat stress may range from transient heat fatigue or rashes to serious illness or death.

Many factors contribute to heat stress, including PPE, ambient temperature and humidity, workload, and the physical condition of the employee, as well as predisposing medical conditions. However, the primary factors are elevated ambient temperatures in combination with fluid loss. Because heat stress is one of the more common health concerns that may be encountered during field activities, employees must be familiar with the signs, symptoms, and various treatment methods of each form of heat stress. Heat stroke is the most serious heat-related illness—it is a threat to life and has a 20 percent mortality rate. Direct exposure to sun, poor air circulation, poor physical condition, and advanced age directly affect the tendency to heat stroke. Table 1 lists the most serious heat conditions, their causes, signs and symptoms, and treatment.

Training is an important component of heat stress prevention. Employees are instructed to recognize and treat heat-related illnesses during 8-hour health and safety refresher and first aid training courses. When working in hot environments, specific steps should be taken to lessen the chances of heat-related illnesses. These include the following:

- Ensuring that all employees drink plenty of fluids (Gatorade® or its equivalent)
- Ensuring that frequent breaks are scheduled so overheating does not occur
- Revising work schedules, when necessary, to take advantage of the cooler parts of the day (such as working from 5:00 a.m. to 11:00 a.m. and 6:00 p.m. to nightfall).

When PPE must be worn (especially Levels A and B), suggested guidelines relating to ambient temperature and maximum wearing time per excursion are as shown in Table 2.

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TABLE 1
HEAT STRESS CONDITIONS

Condition	Causes	Signs and Symptoms	Treatment
Heat cramps	Fluid loss and electrolyte imbalance from dehydration	<ul style="list-style-type: none">• Painful muscle cramps, especially in legs and abdomen• Faintness• Profuse perspiration	<ul style="list-style-type: none">• Move affected worker to cool location• Provide sips of liquid such as Gatorade®• Stretch cramped muscles• Transport affected worker to hospital if condition worsens
Heat Exhaustion	Blood transport to skin to dissipate excessive body heat, resulting in blood pooling in the skin with inadequate return to the heart	<ul style="list-style-type: none">• Weak pulse• Rapid and shallow breathing• General weakness• Pale, clammy skin• Profuse perspiration• Dizziness• Unconsciousness	<ul style="list-style-type: none">• Move affected worker to cool area• Remove as much clothing as possible• Provide sips of cool liquid or Gatorade® (only if conscious)• Fan the person but do not overcool or chill• Treat for shock• Transport to hospital if condition worsens
Heat Stroke	Life threatening condition from profound disturbance of body's heat-regulating mechanism	<ul style="list-style-type: none">• Dry, hot, and flushed skin• Constricted pupils• Early loss of consciousness• Rapid pulse• Deep breathing at first, and then shallow breathing• Muscle twitching leading to convulsions• Body temperature reaching 105 or 106 °F or higher	<ul style="list-style-type: none">• Immediately transport victim to medical facility• Move victim to cool area• Remove as much clothing as possible• Reduce body heat promptly by dousing with water or wrapping in wet cloth• Place ice packs under arms, around neck, at ankles, and wherever blood vessels are close to skin surface• Protect patient during convulsions

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TABLE 2
SUGGESTED GUIDELINES WHEN WEARING PPE

Ambient Temperature	Maximum PPE Wearing Time per Excursion
Above 90 °F	15 minutes
85 to 90 °F	30 minutes
80 to 85 °F	60 minutes
70 to 80 °F	90 minutes
60 to 70 °F	120 minutes
50 to 60 °F	180 minutes

Source: National Institute for Occupational Safety and Health (NIOSH). 1985. Memorandum Regarding Recommended Personal Protective Equipment Wearing Times at Different Temperatures. From Austin Henschel. To Sheldon Rabinovitz. June 20.

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To monitor the level of an employee's heat stress, the following should be measured:

- Heart Rate: Count the radial (wrist) pulse during a 30-second period as early as possible in the rest period; if heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the next work cycle by one-third and keep the rest period the same.

If the heart rate still exceeds 110 beats per minute at the next period, shorten the following work cycle by one-third.

- Oral Temperature: Use a clinical thermometer (3 minutes under the tongue) to measure the oral temperature at the end of the work period. If oral temperature exceeds 99.6 °F (37.6 °C), shorten the next work cycle by one-third without changing the rest period. If oral temperature still exceeds 99.6 °F at the beginning of the next rest period, shorten the following work cycle by one-third. Do not permit a worker to wear impermeable PPE when his or her oral temperature exceeds 100.6 °F (38.1 °C).

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TETRA TECH, INC.
HEALTH AND SAFETY MANUAL
VOLUME III

SAFE WORK PRACTICES (SWP)

COLD STRESS

SWP NO.: 6-16

ISSUE DATE: JULY 1998

REVISION NO.: 1

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swp6-16_cold_stress

COLD STRESS

This safe work practices (SWP) describes situations where cold stress is likely to occur and discusses procedures for the prevention and treatment of cold-related injuries and illnesses. Cold conditions may present health risks to employees during field activities. The two primary factors that influence the risk potential for cold stress are temperature and wind velocity. Wetness can also contribute to cold stress. Other factors that increase susceptibility to cold stress include age (very young or old), smoking, alcohol consumption, fatigue, and wet clothing. Hypothermia can occur at temperatures above freezing if the individual has on wet or damp clothing or is immersed in cold water. The combined effect of temperature and wind can be evaluated using a wind chill index as shown in Table 1.

Bare flesh and body extremities that have high surface area-to-volume ratios such as fingers, toes, and ears are most susceptible to wind chill or extremely low ambient temperatures. Because cold stress can create the potential for serious injury or death, employees must be familiar with the signs and symptoms and various treatments for each form of cold stress. Table 2 provides information on frostbite and hypothermia, the two most common forms of cold-related injuries.

Training is an essential component of cold stress prevention. Employees are instructed to recognize and treat cold-related injuries during 8-hour health and safety refresher and first aid training courses. When working in cold environments, specific steps should be taken to lessen the chances of cold-related injuries. These include the following:

- Protecting of exposed skin surfaces with appropriate clothing (such as face masks, handwear, and footwear) that insulates, stays dry, and blocks wind
- Shielding the work area with windbreaks to reduce the cooling effects of wind
- Providing equipment for keeping workers' hands warm by including warm air jets and radiant heaters in addition to insulated gloves
- Using adequate insulating clothing to maintain a body core temperature of above 36 °C
- Providing extra insulating clothing on site

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TABLE 1
COOLING POWER OF WIND ON EXPOSED FLESH EXPRESSED
AS EQUIVALENT TEMPERATURE

Estimated Wind Speed (in miles per hour - mph)	Actual Temperature Reading (°F)											
	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
	Equivalent Chill Temperature (°F)											
CALM	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
(Wind speeds greater than 40 mph have little additional effect.)	<i>LITTLE DANGER</i> in less than 1 hour with dry skin; maximum danger from false sense of security			<i>INCREASING DANGER</i> from freezing of exposed flesh within 1 minute				<i>GREAT DANGER</i> that flesh may freeze within 30 seconds				

Trench foot may occur at any point on this chart.

Source: Modified from American Conference of Governmental Industrial Hygienists. 1997.
"Threshold Limit Values for Chemical Substances and Physical Agents."

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TABLE 2
COLD STRESS CONDITIONS

Condition	Causes	Signs and Symptoms	Treatment
Frostbite	Freezing of body tissue, usually the nose, ears, chin, cheeks, fingers, or toes	<ul style="list-style-type: none">• Pain in affected area that later goes away• Area feels cold and numb• Incipient frostbite (frostnip) - skin is blanched or whitened and feels hard on the surface• Moderate frostbite - large blisters• Deep frostbite - tissues are cold, pale, and hard	<ul style="list-style-type: none">• Move affected worker to a warm area• Immerse affected body part in warm (100 to 105 °F) water—not hot!• Handle affected area gently; do not rub• After warming, bandage loosely and seek immediate medical treatment
Hypothermia	Exposure to freezing or rapidly dropping temperatures	<ul style="list-style-type: none">• Shivering, dizziness, numbness, weakness, impaired judgment, and impaired vision• Apathy, listlessness, or sleepiness• Loss of consciousness• Decreased pulse and breathing rates• Death	<ul style="list-style-type: none">• Immediately move affected person to warm area• Remove all wet clothing and redress with loose, dry clothes• Provide warm, sweet drinks or soup (only if conscious)• Seek immediate medical treatment

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- Reducing the duration of exposure to cold
- Changing wet or damp clothing as soon as possible

During periods of extreme cold (10 °F or less) workers should use the buddy system to ensure constant protective observation.

Specific monitoring criteria are not established for cold stress. However, employees should be thoroughly cognizant of the signs and symptoms of frostbite and hypothermia (see Table 1) in themselves as well as in coworkers. All instances of cold stress should be reported to the site safety coordinator. Work schedules may be adjusted and warm-up regimes imposed as needed to deal with temperature and wind conditions.

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TETRA TECH, INC.
HEALTH AND SAFETY MANUAL
VOLUME III

SAFE WORK PRACTICES (SWP)

BIOHAZARDS

SWP NO.: 6-17

ISSUE DATE: JULY 1998

REVISION NO.: 1

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swp6-17_biohazards

BIOHAZARDS

Biological hazards, or "biohazards," include plants, animals or their products, and parasitic or infectious agents that may present potential risks to worker health. This safe work practice (SWP) discusses procedures for working with biohazards, preventive guidelines, and first-aid procedures for the most common hazards field staff are likely to encounter. This SWP does not address biohazards such as those associated with medical waste. Procedures for working with this type of biohazard should be addressed in the site-specific health and safety plan (HASP) on a case-by-case basis.

During preparation of the site-specific HASP, the preparer should consider which plants, animals, and other biological agents may be encountered; assess their potential risk to project personnel; and attach this SWP to the HASP, if necessary. Office health and safety representatives should become familiar with biological hazards indigenous to the geographical area in which most of their office personnel work and assist in evaluating the risks to personnel on projects staffed from their offices. SWPs for insects, snakes, animals, plants, waterborne pathogens (giardia), and hantavirus are provided below.

1.0 INSECTS

SWPs for reducing the chance of insect bites or stings and for treating bites or stings are listed below.

- Workers should keep as much skin area covered as possible by wearing long-sleeved shirts, long pants, and a hat. Pant legs should be tucked into socks or boots and shirts into pants. In addition, workers should wear light colored clothing.
- A proven insect repellent should be used on bare skin and clothing.
- When possible, tall grasses and brush that could harbor ticks should be avoided.
- Several times during the day and at the end of the work day, each worker should perform a check for evidence of imbedded ticks or previous bites. Particular attention should be paid to the scalp, neck, ankles, back of the legs, and waist.
- When opening well covers, vaults, or other closed items, workers should watch for hornet or wasp nests and black widow or brown recluse spiders. Workers should never reach into spaces with unprotected arms.
- Workers should watch carefully for bees around open soft drinks or food.

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- If a worker is stung by a bee, the stinger should be carefully removed, if present. The wound should be washed and a cold pack applied. Allergic reaction should be watched for and is evidenced by extreme swelling, redness, pain, or difficulty breathing.
- If a worker is stung or bit by a spider or scorpion, medical attention should be obtained immediately.

2.0 SNAKES

SWPs for encounters with snakes and for treating snakebites are listed below.

- Workers should avoid walking in areas known to harbor snakes. Workers should be cautious when picking up or moving items that have been on the ground.
- Workers should wear boots made of heavy material that protect the ankles and pants. Heavy work gloves should be worn for picking up items.
- If one snake is encountered, others may be present. Workers should leave the area by retracing their steps.
- If a worker is bitten, the wound should be washed and the injured area immobilized and kept lower than the heart, if possible. Ice or a tourniquet should not be applied to a snake bite. The wound should not be cut. If medical care is more than 30 minutes away from a work site, a snakebite kit should be available on site and workers should know how to use it.

3.0 ANIMALS

SWPs for encounters with animals and for treating associated wounds are listed below.

- If workers encounter a wild animal, the animal should be observed for unusual behavior such as a nocturnal animal out during the day, drooling, an appearance of partial paralysis, irritability, meanness, or a strangely quiet demeanor.
- Workers should never touch the body of a dead animal because certain diseases could be carried by fleas still on the body.
- Workers should avoid animal droppings (including bird droppings). Pathogens, some of which can become airborne, may still be present in the droppings.
- If a worker is bitten, he or she should get away from the animal to avoid further bites. Workers should not try to stop, hold, or catch the animal.

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- If the wound is minor, it should be washed with soap and water. Any bleeding should then be controlled, and an antibiotic ointment and dressing should be applied. All animal bite wounds should be watched for signs of infection.
- If the wound is bleeding seriously, the bleeding should be controlled but the wound should not be cleaned. Medical assistance should be summoned immediately.
- If a rabid animal is suspected, immediate medical attention should be summoned. If possible, workers should try to remember what the rabid animal looked like and the area in which it was last seen. The animal should be reported by calling the local emergency number.

4.0 PLANTS

SWPs for plants are as follows:

- Workers should be aware of the types and appearances of poisonous plants in the work site area. Poison ivy, oak, and sumac are the most frequently encountered plants that can cause reaction from casual contact. If a worker is extremely sensitive to these plants, he or she should avoid the area entirely because airborne drift could be sufficient to cause a reaction. Other plants, such as fireweed, can cause painful, short-term irritation and should be avoided as well. Workers should avoid touching face and eye areas after contact with any suspicious plant.
- Workers should wear proper clothing if working in or near overgrown areas. Disposable outerwear should be used, if necessary, and workers should not touch the material with bare hands during removal if the outerwear may have contacted poisonous plants.
- If contact with a poisonous plant has occurred, the affected area should be immediately washed thoroughly with soap and water. If a rash or weeping sore has already begun to develop, a paste of baking soda and water should be applied to the area several times a day to reduce discomfort. Lotions such as Calamine or Caladryl should be applied to help soothe the area. If the condition gets worse and affects large areas of the body or the face, a doctor should be consulted.
- Bushy and wooded areas should be thoroughly checked for thorn-bearing trees, brush, and bramble. In some cases, impalement can cause severe pain or infection.

5.0 WATERBORNE PATHOGENS-GIARDIA

Giardia is a waterborne pathogen consisting of a protoplasmic parasite of the mammalian digestive tract. Giardia is present worldwide, with the highest occurrence in areas with poor sanitation. In the United

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States, most reported cases are in mountainous regions where drinking water is obtained from streams and is unfiltered or untreated.

Giardia is contracted by ingesting water contaminated with giardia cysts in the dormant state. Giardia parasites can only thrive in the digestive tracts of mammals. Dormant giardia organisms enter water through the feces of infected animals or humans. Giardia symptoms include severe diarrhea and upset stomach. Some people are asymptomatic but can transmit the disease to others. Medical treatment of giardia can be difficult and unpleasant; therefore, prevention is critical. Precautions for preventing exposure to giardia are listed below.

- Workers should assume that all fresh water streams are infected with the giardia organism and not drink any untreated water.
- Team members collecting sediment and water samples from streams should wash their hands thoroughly with soap and water after collecting the samples.
- Giardia parasites are relatively easy to destroy or filter. Water should be treated for drinking or cooking with iodine or another recommended giardia treatment before use.

6.0 HANTAVIRUS

Hantavirus pulmonary syndrome (HPS) is a potentially fatal infection caused by a rodent-borne hantavirus. HPS begins with a brief illness most commonly characterized by fever, muscle pain, headache, coughing, and nausea or vomiting. Other early symptoms include chills, diarrhea, shortness of breath, abdominal pain, and dizziness. In the first identified cases of HPS, this stage of the infection lasted 2 to 5 days before victims were hospitalized. Typically, by the time of hospitalization, victims were found to have tachycardia (a heart rate of greater than 100 beats per minute) and tachypnea (a breathing rate of greater than 20 breaths per minute). Fever was also common. In most cases, death occurred within 2 to 16 days of the onset of symptoms, and victims exhibited pulmonary edema and severe hypotension.

Currently, experts believe that HPS is spread by the deer mouse (*Peromyscus maniculatus*). Though the deer mouse has been found to be the primary host of hantavirus, several other rodent species have also tested positive for the virus. Pinon mice (*Peromyscus truei*), brush mice (*Peromyscus boylii*), and

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western chipmunks (*Tamias spp.*) are also likely to carry the virus. Also, cases of HPS have been reported in areas of the United States where these particular rodents are not indigenous.

Infected rodents shed the virus in their urine, feces, and saliva. Humans can be exposed to the virus through (1) inhalation of suspended rodent excreta or dust particles containing rodent excreta, (2) introduction of rodent excreta into the eyes or broken skin, and (3) ingestion of food or water contaminated by rodent excreta. HPS has a reported mortality rate of 55 percent. Transmission of hantavirus from infected individuals to healthy persons has not been documented.

Prevention of HPS infection is essential because no known antidote and no specific treatment exists for treating HPS. Therefore, employees should practice risk reduction and control measures. Guidelines for workers in locations that may have rodent infestations or habitats are listed below.

- The best approach for HPS control and prevention is through environmental hygiene practices that deter rodents from colonizing the work environment.
- Information about the symptoms of HPS and detailed guidance on preventive measures should be provided to all employees assigned to field activities.
- Medical attention should be sought immediately for workers who develop a febrile or respiratory illness within 45 days of the last potential exposure to rodents. Attending physicians should be advised of each worker's potential for occupational exposure to hantavirus. Physicians should contact local health authorities promptly if hantavirus-associated illness is suspected. A blood sample should be obtained from the affected worker and forwarded with the baseline serum sample through the state health department to the Centers for Disease Control and Prevention for hantavirus antibody testing.
- Respiratory protective equipment should be worn when handling rodents, when removing rodents from traps, and when working in areas with evidence of rodent droppings or hair. Respiratory protective equipment should include, at a minimum, a half-face air-purifying respirator (APR) or powered APR equipped with a high-efficiency particulate air (HEPA) filter (P100). Full-face regulators may be needed under some circumstances. Respiratory protective equipment should be used in accordance with Occupational Safety and Health Administration regulations.
- Dermal protection should be worn when handling rodents or traps containing rodents, or if contact with contaminated surfaces could occur. Dermal protection should include rubber or plastic gloves that should be washed and disinfected before removal.

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- A trap contaminated with rodent urine or feces or in which a rodent was captured should be disinfected with a commercial disinfectant or a 0.4 percent bleach solution. A dead rodent should be disposed of by placing the carcass in a plastic bag containing enough general-purpose household disinfectant to thoroughly wet the carcass. The bag should be sealed and disposed of by burning or by burying it in a 2- to 3-foot-deep hole. Local and state health departments can also provide appropriate disposal methods.

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TETRA TECH, INC.
HEALTH AND SAFETY MANUAL
VOLUME III

SAFE WORK PRACTICES (SWP)

USE OF HEAVY EQUIPMENT

SWP NO.: 6-26
ISSUE DATE: JULY 1998
REVISION: 1

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swp6-26_use_of_heavy_equipment

USE OF HEAVY EQUIPMENT

Truck-mounted heavy equipment and field trucks are among the types of equipment that may be used during field work. Heavy equipment can present a substantial hazard to workers. General requirements for motor vehicles and material-handling equipment are provided in the Occupational Safety and Health Administration (OSHA) Construction Industry Standards, 29 CFR 1926, Subpart O. The following precautions will be followed when heavy equipment (such as drill rigs, front-end loaders, and backhoes) is in use:

- Heavy equipment will be inspected by the operator before each work shift. The site safety coordinator (SSC) will ensure compliance with these precautions
- Equipment operators will be instructed to report any abnormalities, such as equipment failure, oozing liquids, and unusual odors, to their supervisors or the SSC
- Only qualified and licensed personnel will operate heavy equipment
- Hard hats, steel-toed boots, and safety glasses or goggles will be worn at all times around heavy equipment. Other personal protective equipment (PPE) specified in the site health and safety plan (HASP) will also be required
- Workers will not assume that the equipment operator is keeping track of their exact location. Workers will never walk directly behind or to the side of heavy equipment without the operator's knowledge
- Workers in close proximity to heavy equipment will maintain visual contact with equipment operators at all times
- When an operator must maneuver equipment in tight quarters, the presence of a second person will be required to ensure adequate clearance. If backing is required, two ground guides will be used: one in the direction the equipment is moving, and the other in the operators's normal field of vision to relay signals
- All heavy equipment used at a contaminated work site will be kept in the exclusion zone until the work has been completed. Such equipment will then be decontaminated within the designated decontamination area
- Hand-signal communications will be established when verbal communication is difficult. One person per work team will be designated to give hand signals to equipment operators
- Equipment with an obstructed rear view must have an audible alarm that sounds when the equipment is moving in reverse (unless a spotter guides the operator)

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- Parking brakes will be kept engaged when equipment is not in use
- Blades, buckets, dump bodies, and other hydraulic systems will be kept fully lowered when equipment is not in use
- Equipment cabs will be kept free of all nonessential and loose items
- Seat belts must be present in all vehicles having a rollover protective structure (ROPS)
- With certain exceptions, all material-handling equipment must be equipped with ROPS
- Material-handling equipment that lacks a ROPS will not be operated on a grade unless the grade can safely accommodate the equipment involved
- Drilling auger sections and other equipment are extremely heavy. All precautions must be taken before moving heavy equipment. Appropriate equipment must be used to transport heavy equipment
- Only chains, hoists, straps, and other equipment that safely aids transport of heavy materials will be used
- Proper personal lifting techniques will be used. Workers will lift using their legs, not their backs
- A safety barrier will be used to protect workers when tires are inflated, removed, or installed on split rims
- An ongoing maintenance program for all tools and equipment must be in place. All tools and moving equipment will be inspected regularly to ensure that parts are secured, are intact, and have no cracks or areas of weakness. The equipment must turn smoothly without wobbling and must operate according to manufacturer specifications. Defective items will be promptly repaired or replaced. Maintenance and repair logs will be kept
- Tools will be stored in clean, secure areas to prevent damage, loss, or theft
- Workers will not use equipment with which they are not familiar. This precaution applies to heavy as well as light equipment
- Loose-fitting clothing and loose, long hair will be prohibited around moving machinery
- Workers will make sure that no underground or overhead power lines, sewer lines, gas lines, or telephone lines present a hazard in the work area
- All personnel who are not essential to work activities will be kept out of the work area

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- Workers will be aware of their footing at all times
- Workers will remain alert at all times

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APPENDIX C

RESPIRATORY HAZARD ASSESSMENT (FORM RP-2)

(Two Pages)

Note: This assessment form will be finalized when site air monitoring data are collected and evaluated. Until the assessment is completed, air purifying respirator cartridges will be disposed of every 8 hours.



TETRA TECH, INC.

RESPIRATORY HAZARD ASSESSMENT

Project Name: Filed Oversight of PRP Removal Action at the Celotex Superfund Site		Project No.:026-VOBB-055Q	
Location: Chicago, IL		Project Manager: Mary Wojciechowski	
Type: <input checked="" type="checkbox"/> Baseline <input type="checkbox"/> Reassessment		Date: 6/14/07	
		Valid for 150 days	
Job/Task Description: Field oversight of contaminated soil removal and cap installation		<input checked="" type="checkbox"/> Routine <input type="checkbox"/> Escape	
Hazard Identification and Source: PAHs, Particulates		Workplace Factors: Temperature: X Humidity: X Other: _____	
		User Factors: Work rate: _____ Protective clothing: _____ Other: _____	
Chemical:	PAHs		
PEL:	0.2 mg/m ³		
ACGIH TLV:	0.1 mg/m ³		
Form (part/gas/vapor):	part		
IDLH:	80 mg/m ³		
Eye Irritant (Y/N):	Y		
Skin Absorption(Y/N):	N		
Monitoring (Y/N) :*	Y		
Frequency:	Per PRP HASP		
Maximum Concentration Estimated:**			
* Monitoring Method: <input type="checkbox"/> PID <input type="checkbox"/> FID <input type="checkbox"/> Detector tube:		Respirator Type: <input type="checkbox"/> Half-face disposable Brand: _____ <input type="checkbox"/> Half-face reusable Brand: _____ <input type="checkbox"/> Full-face Brand: _____ <input type="checkbox"/> Air-supplied airline Brand: _____ <input type="checkbox"/> Air-supplied SCBA Brand: _____ <input type="checkbox"/> PAPR Brand: _____ <input type="checkbox"/> ESCBA Brand: _____	
<input type="checkbox"/> NIOSH method: _____ <input type="checkbox"/> Vapor badge: _____ <input type="checkbox"/> Other: Per PRP HASP			
** If concentrations exceed the immediately dangerous to life and health (IDLH) value, use air-supplied systems.		Vapor and Gas Cartridge Exchange: ESLI: <input type="checkbox"/> Yes <input type="checkbox"/> No Exchange frequency: _____	
Cartridge/Filter Selection <input type="checkbox"/> N100 <input type="checkbox"/> R100 <input type="checkbox"/> P100 <input type="checkbox"/> N99 <input type="checkbox"/> R99 <input type="checkbox"/> P99 <input type="checkbox"/> N95 <input type="checkbox"/> R95 <input type="checkbox"/> P95 <input type="checkbox"/> Organic vapor <input type="checkbox"/> Acid gas <input type="checkbox"/> Ammonia <input type="checkbox"/> Mercury <input type="checkbox"/> Formaldehyde <input type="checkbox"/> Combo: _____ <input type="checkbox"/> Other: _____		Basis for Exchange Frequency <input type="checkbox"/> Manufacturer's data <input type="checkbox"/> Workplace simulations <input type="checkbox"/> Experimental methods <input type="checkbox"/> AIHA "Rules of Thumb" <input type="checkbox"/> Predictive modeling <input type="checkbox"/> Analogous chemical structure <input type="checkbox"/> OSHA Regulation: _____ <input type="checkbox"/> Other: _____	
Mary Wojciechowski Completed by		6/14/07 Date	
		Reviewed by Date	

RESPIRATORY HAZARD ASSESSMENT (Continued)

DEFINITIONS AND ACRONYMS

ACGIH	American Conference of Governmental Industrial Hygienists
AIHA	American Industrial Hygiene Association
ESLI	End of service life indicator
FID	Flame ionization detector
IDLH	Immediately dangerous to life and health
NIOSH	National Institute for Occupational Safety and Health
N100/99/95	Non-oil-proof particulate filter
OSHA	Occupational Safety and Health Administration
P100/99/95	Oil-proof particulate filter
PEL	Permissible exposure limit
PID	Photoionization detector
PPE	Personal protective equipment
R100/99/95	Oil-resistant particulate filter
SCBA	Self-contained breathing apparatus
TLV	Threshold limit value

Note: This form must be reviewed by a regional health and safety representative or subsidiary health and safety representative (or designee) only and must be attached to the site-specific health and safety plan once completed. A copy must also be placed in the project files.

ATTACHMENT 1

REMEDIATION CONTRACTOR AIR MONITORING PROGRAM
(2 sheets)

5.0 Air Monitoring/Sampling

Air monitoring and sampling must be performed to verify that workers and residents are not be exposed to harmful levels of airborne contaminants.

Refer to CH2M HILL SOP HSE-207, *Exposure Assessment for Airborne Chemical Hazards*, for additional information

5.1 Air Monitoring Specifications

Air monitoring specifications are summarized in Table 5-1.

Table 5-1					
Instrument	Tasks	Action Levels ^a		Frequency ^b	Calibration
Photoionization Detector: OVM with 10.6eV lamp or equivalent	All	ND-1 ppm – up to 10 ppm if benzene is zero If readings exceed 1 ppm, benzene monitoring shall commence	Level D	As needed, when unknown conditions are encountered	Daily
		10 – 100 ppm	Level C		
Colorimetric Tube: Drager or equivalent benzene specific 0.5/c (0.5 to 10 ppm range) with pre-tube, or equivalent	All	<0.5 - 1 ppm	Level D	As needed, when unknown conditions are encountered	Not applicable
		1 - 10 ppm	Level C		
		>10 ppm	Level B		
*Dust Monitor: Miniram model PDM-3 or equivalent	Excavation	0 – 2.5 mg/m ³	Level D	Initially and periodically during tasks	Zero Daily
		2.5 – 5 mg/m ³	Level D/ D modified		
		> 5 mg/m ³	Stop work, Increase engineering controls, re- evaluate		
Combustible Gas Indicator: MSA model 260 or 261 or equivalent	Excavation	0-10% LEL	No explosion hazard	Continuous during advancement of boring or trench	Daily
		10-25% LEL	Potential explosion hazard		
		>25% LEL	Explosion hazard; evacuate or vent		
Oxygen Meter: MSA model 260 or 261 or equivalent	Excavation	> 25% ^c O ₂	Explosion hazard; evacuate or vent	Continuous during advancement of boring or trench	Daily
		20.9% ^c O ₂	Normal O ₂		
		< 19.5% ^c O ₂	O ₂ deficient; vent or use SCBA		

Table 5-1

Instrument	Tasks	Action Levels ^a	Frequency ^b	Calibration
Noise-Level :	All	Conversations can be held at distances of 3 feet without shouting	Initially and periodically during task	NA
*Auditory		Conversations cannot be held at a distances of 3 feet without shouting	Hearing protection required	

*Conducted by removal action subcontractor (Arrowhead)

^a Action levels apply to sustained (3 minutes or longer) breathing-zone measurements above background.

^b The exact frequency of monitoring depends on field conditions and is to be determined by the SC; generally, every 5 to 15 minutes if acceptable; more frequently may be appropriate. Monitoring results should be recorded. Documentation should include instrument and calibration information, time, measurement results, personnel monitored, and place/location where measurement is taken (e.g., "Breathing Zone/MW-3," "at surface/SB-2," etc.).

^c Noise monitoring shall be used at the discretion of the SC.

5.2 Calibration

Instruments will be function tested in accordance with the respective manufacturer's instructions for proper instrument use and maintenance. The instrument vendor or the CH2M HILL warehouse staff will ensure equipment has been calibrated in accordance with manufacturer's specifications.

All direct reading instruments will be function tested daily by the SC using span gas, prior to performing work activities and after the completion of the daily activities.

5.3 Air Sampling

Perimeter air sampling for polychlorinated aromatic hydrocarbons (PAHs) and total particulate (dust) will be performed during upcoming removal action implementation activities.

Real time dust monitoring will be performed throughout the duration of field activities. This dust monitoring will consist of (1) continuous measurements at site boundaries (e.g. outside of the exclusion zone) and (2) real-time measurements at periodic intervals inside the exclusion zones and during high visible dust episodes. Real-time dust monitoring will also be performed at upwind and downwind location at the discretion of the HSM or SC. Action levels for dust are identified in Table 5-1.

Perimeter air samples will be collected at select locations throughout the removal action area. These locations will be selected to evaluate both ambient and downwind levels. The samples will be collected using high-volume sample pumps in accordance with EPA Method TO-13 (PAH and semi-volatile organic compounds by High-Volume PUF sampling). Up to four perimeter samples may be collected during each sampling event. At a minimum, one sample will be collected directly downwind, based on morning wind directions, at the outer perimeter of the work zone and one collected upwind. Additional samples may be

ATTACHMENT 2
MATERIAL SAFETY DATA SHEETS

(10 Sheets)

Alconox

Isobutylene

Methane

MSDS Number: A2052 ***** Effective Date: 05/14/03 ***** Supersedes: 02/18/03



ALCONOX®

1. Product Identification

Synonyms: Proprietary blend of sodium linear alkylaryl sulfonate, alcohol sulfate, phosphates, and carbonates.

CAS No.: Not applicable.

Molecular Weight: Not applicable to mixtures.

Chemical Formula: Not applicable to mixtures.

Product Codes: A461

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Alconox® proprietary detergent mixture	N/A	90 - 100%	Yes

3. Hazards Identification

Emergency Overview

CAUTION! MAY BE HARMFUL IF SWALLOWED OR INHALED. MAY CAUSE IRRITATION TO EYES AND RESPIRATORY TRACT.

J.T. Baker SAF-T-DATA^(tm) Ratings (Provided here for your convenience)

Health Rating: 1 - Slight

Flammability Rating: 0 - None

Reactivity Rating: 1 - Slight

Contact Rating: 2 - Moderate

Lab Protective Equip: GOGGLES; LAB COAT

Storage Color Code: Orange (General Storage)

Potential Health Effects

Inhalation:

May cause irritation to the respiratory tract. Symptoms may include coughing and shortness of breath.

Ingestion:

May cause irritation to the gastrointestinal tract. Symptoms may include nausea, vomiting and diarrhea.

Skin Contact:

No adverse effects expected.

Eye Contact:

May cause irritation, redness and pain.

Chronic Exposure:

No information found.

Aggravation of Pre-existing Conditions:

No information found.

4. First Aid Measures

Inhalation:

Remove to fresh air. Get medical attention for any breathing difficulty.

Ingestion:

If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention.

Skin Contact:

Wash exposed area with soap and water. Get medical advice if irritation develops.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:

Not expected to be a fire hazard.

Explosion:

No information found.

Fire Extinguishing Media:

Dry chemical, foam, water or carbon dioxide.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Pick up and place in a suitable container for reclamation or disposal, using a method that does not generate dust. When mixed with water, material foams profusely. Small amounts of residue may be flushed to sewer with plenty of water.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Moisture may cause material to cake. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

None established.

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures as low as possible. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):

For conditions of use where exposure to dust or mist is apparent and engineering controls are not feasible, a particulate respirator (NIOSH type N95 or better filters) may be worn. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P filter. For emergencies or instances where the exposure levels are not known, use a full-face positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:

Wear protective gloves and clean body-covering clothing.

Eye Protection:

Use chemical safety goggles. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:

White powder interspersed with cream colored flakes.

Odor:

No information found.

Solubility:

Moderate (1-10%)

Specific Gravity:

No information found.

pH:

No information found.

% Volatiles by volume @ 21C (70F):

0

Boiling Point:

No information found.

Melting Point:

No information found.

Vapor Density (Air=1):

No information found.

Vapor Pressure (mm Hg):

No information found.

Evaporation Rate (BuAc=1):

No information found.

10. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:

Carbon dioxide and carbon monoxide may form when heated to decomposition.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

No information found.

Conditions to Avoid:

No information found.

11. Toxicological Information

No LD50/LC50 information found relating to normal routes of occupational exposure.

-----\Cancer Lists\-----			
Ingredient	--NTP Carcinogen--		IARC Category
	Known	Anticipated	
Alconox® proprietary detergent mixture	No	No	None

12. Ecological Information

Environmental Fate:

This product is biodegradable.

Environmental Toxicity:

No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Not regulated.

15. Regulatory Information

-----\Chemical Inventory Status - Part 1\-----				
Ingredient	TSCA	EC	Japan	Australia
Alconox® proprietary detergent mixture	Yes	No	No	No

-----\Chemical Inventory Status - Part 2\-----				
Ingredient	--Canada--			
	Korea	DSL	NDSL	Phil.
Alconox® proprietary detergent mixture	No	No	Yes	No

-----\Federal, State & International Regulations - Part 1\-----				
Ingredient	-SARA 302-		-SARA 313-	
	RQ	TPQ	List	Chemical Catg.
Alconox® proprietary detergent mixture	No	No	No	No

-----\Federal, State & International Regulations - Part 2\-----			
Ingredient	-RCRA-		-TSCA-
	CERCLA	261.33	8(d)
Alconox® proprietary detergent mixture	No	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: No Fire: No Pressure: No
Reactivity: No (Pure / Solid)

Australian Hazchem Code: None allocated.

Poison Schedule: None allocated.

WHMIS:

This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information

required by the CPR.

16. Other Information

NFPA Ratings: Health: 0 Flammability: 0 Reactivity: 0

Label Hazard Warning:

CAUTION! MAY BE HARMFUL IF SWALLOWED OR INHALED. MAY CAUSE IRRITATION TO EYES AND RESPIRATORY TRACT.

Label Precautions:

Avoid contact with eyes.

Keep container closed.

Use with adequate ventilation.

Avoid breathing dust.

Wash thoroughly after handling.

Label First Aid:

If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of eye contact, immediately flush eyes with plenty of water for at least 15 minutes. In all cases, get medical attention.

Product Use:

Laboratory Reagent.

Revision Information:

MSDS Section(s) changed since last revision of document include: 8.

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Prepared by: Environmental Health & Safety

Phone Number: (314) 654-1600 (U.S.A.)

BACHARACH INC -- 51-2394 CALIBRATION GAS, METHANE 2% IN AIR

MSDS Safety Information

FSC: 6830

MSDS Date: 03/20/1992

MSDS Num: BXXPQ

LIIN: 00F042761

Product ID: 51-2394 CALIBRATION GAS, METHANE 2% IN AIR

MFN: 01

Responsible Party

Cage: 05083

Name: BACHARACH INC

Address: 625 ALPHA DR

City: PITTSBURGH PA 15238

Info Phone Number: 412-963-2223 OR FAX 412-963-2091

Emergency Phone Number: 800-424-9300

Review Ind: Y

Published: Y

Preparer Co. when other than Responsible Party Co.

Cage: 05083

Name: BACHARACH INC

Address: 625 ALPHA DRIVE

City: PITTSBURGH PA 15238

Contractor Summary

Cage: 05083

Name: BACHARACH INC

Address: 625 ALPHA DRIVE

City: PITTSBURGH PA 15238

Phone: 412-963-2130

Ingredients

Cas: 74-82-8

RTECS #: PA1490000

Name: METHANE

% Wt: 2.0

ACGIH TLV: SIMPLE ASPHYXIAN

Name: AIR

% Wt: 98

Health Hazards Data

Route Of Entry Inds - Inhalation: NO

Skin: NO

Ingestion: NO

Carcinogenicity Inds - NTP: NO

IARC: NO

OSHA: NO

Effects of Exposure: METHANE IS A NON-TOXIC SIMPLE ASPHYXIAN. THE CONCENTRATION OF METHANE IN THIS GAS IS TOO LOW TO DEPRESS OXYGEN CONCENTRATION.

Explanation Of Carcinogenicity: NONE

First Aid: OBTAIN MEDICAL ATTENTION IN ALL CASES.

Handling and Disposal

Waste Disposal Methods: DISPOSE OF IN ACCORDANCE W/LOCAL, STATE, & FEDERAL REGULATIONS.

Handling And Storage Precautions: DON'T STORE CYLINDERS NEAR HEAT/OPEN FLAME. EXPOSURE TO TEMPERATURES ABOVE 130F MAY CAUSE RUPTURE, SECURE CYLINDERS-DON'T DROP.

Other Precautions: KEEP CYLINDERS AWAY FROM HEAT & FLAMES.

Fire and Explosion Hazard Information

Flash Point Method: CC

Flash Point Text: -188C

Lower Limits: 5%

Upper Limits: 15%

Extinguishing Media: COOL EXPOSED CONTAINERS W/WATER.

Fire Fighting Procedures: FIREFIGHTERS SHOULD WEAR NIOSH APPROVED POSITIVE PRESSURE SCBA & FULL PROTECTIVE CLOTHING. USE SHIELDING TO PROTECT FROM CYLINDER EXPLOSION

Unusual Fire/Explosion Hazard: THIS MIXTURE IS BELOW THE LEL OF METHANE & NON-FLAMMABLE. COMPRESSED AIR/METHANE MIXTURES AT HIGH PRESSURE WILL ACCELERATE BURNING OF OTHER MATERIAL. (SUPP)

Control Measures

Respiratory Protection: RECOMMENDED

Protective Gloves: LEATHER

Eye Protection: SAFETY GLASSES

Supplemental Safety and Health: CON'T ON UNUSUAL FIRE: GAS CYLINDERS EXPOSED TO HEAT/FLAME MAY VENT RAPIDLY/EXPLODE. THE DATA FOR BOILING POINT, MELTING POINT AND FLASH POINT IS FOR METHANE. AUTOIGNITION TEMPERATURE: 580C METHANE.

Physical/Chemical Properties

B.P. Text: -162C

M.P/F.P Text: -182C

Vapor Density: 0.991

Spec Gravity: 0.673 KG/CUM

Solubility in Water: NEGLIGIBLE

Appearance and Odor: COLORLESS, ODORLESS, TASTELESS COMPRESSED GAS IN CYLINDERS.

Reactivity Data

Stability Indicator: YES

Stability Condition To Avoid: HEAT, FLAMES

Hazardous Polymerization Indicator: NO

Toxicological Information

Ecological Information

MSDS Transport Information

Regulatory Information

Other Information

HAZCOM Label

Product ID: 51-2394 CALIBRATION GAS, METHANE 2% IN AIR

Cage: 05083

Company Name: BACHARACH INC

Street: 625 ALPHA DRIVE

City: PITTSBURGH PA

Zipcode: 15238

Health Emergency Phone: 800-424-9300

Label Required IND: Y

Date Of Label Review: 02/18/1994

Status Code: C

Label Date: 02/18/1994

Origination Code: F

Skin Protection IND: YES

Signal Word: NONE

Health Hazard: None

Contact Hazard: None

Fire Hazard: None

Reactivity Hazard: None

Hazard And Precautions: METHANE IS A NON-TOXIC SIMPLE ASPHYXIAN. THE
CONCENTRATION OF METHANE IN THIS GAS IS TOO LOW TO DEPRESS OXYGEN
CONCENTRATION.

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HNU SYSTEMS INC -- ISOBUTYLENE SPAN GAS, SEE SUPP DATA -- 6665-01-214-8247

===== Product Identification =====

Product ID:ISOBUTYLENE SPAN GAS, SEE SUPP DATA

MSDS Date:12/08/1987

FSC:6665

NIIN:01-214-8247

MSDS Number: BJDVR

=== Responsible Party ===

Company Name:HNU SYSTEMS INC

Address:160 CHARLEMONT ST

City:NEWTON HIGHLANDS

State:MA

ZIP:02161

Country:US

Info Phone Num:617/964-6690

Emergency Phone Num:800/841-4357

CAGE:57631

=== Contractor Identification ===

Company Name:HNU SYSTEMS INC

Address:160 CHARLEMONT ST

Box:City:NEWTON HIGHLANDS

State:MA

ZIP:02161

Country:US

Phone:617/964-6690

CAGE:57631

===== Composition/Information on Ingredients =====

Ingred Name:ISOBUTYLENE

CAS:115-11-7

RTECS #:UD0890000

Fraction by Wt: 0.01%

===== Hazards Identification =====

LD50 LC50 Mixture:NONE SPECIFIED BY MANUFACTURER.

Routes of Entry: Inhalation:YES Skin:NO Ingestion:NO

Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO

Health Hazards Acute and Chronic:ISOBUTYLENE IS A SIMPLE ASPHYXIAN;

MODERATE CONCENTRATION IN AIR CAUSE UNCONSCIOUSNESS. CONTACT

W/LIQUID CAUSES FROSTBITE.

Explanation of Carcinogenicity:NOT RELEVANT

Effects of Overexposure:SEE HEALTH HAZARDS.

Medical Cond Aggravated by Exposure:NONE SPECIFIED BY MANUFACTURER.

===== First Aid Measures =====

First Aid:IF BREATHED, REMOVE INDIVIDUAL TO FRESH AIR. IF BREATHING IS
DIFFICULT, ADMINISTER OXYGEN. IF BREATHING HAS STOPPED, GIVE
ARTIFICIAL RESPIRATION. KEEP PERSON WARM, QUIET; GET MEDICAL
ATTENTION.

===== Fire Fighting Measures =====

Flash Point Method:CC

Flash Point:-76 C OR -105 F

Lower Limits:1.8%

Upper Limits:9.6%

Extinguishing Media:CO2 OR DRY CHEMICAL

Fire Fighting Procedures:STOP FLOW OF ISOBUTYLENE IF POSSIBLE. USE
WATER SPRAY TO COOL SURROUNDING CONTAINERS.

Unusual Fire/Explosion Hazard:ISOBUTYLENE IS HEAVIER THAN AIR MAY
TRAVEL CONSIDERABLE DISTANCE TO SOURCE OF IGNITION. SHOULD FLAME BE
EXTINGUISHED AND FLOW OF GAS CONTINUE SEE SUPP DATA.

===== Accidental Release Measures =====

Spill Release Procedures:NONE SPECIFIED BY MANUFACTURER.

Neutralizing Agent:NONE SPECIFIED BY MANUFACTURER.

===== Handling and Storage =====

Handling and Storage Precautions:STORE AWAY FROM HEAT AND PROTECT
CYLINDERS FROM PHYSICAL DAMAGE.

Other Precautions:DO NOT PUNCTURE CYLINDER.

===== Exposure Controls/Personal Protection =====

Respiratory Protection:POSITIVE PRESSURE AIR LINE OR SCBA FOR EMERGENCY
USE.

Ventilation:HOOD W/FORCED VENTILATION TO PREVENT ACCUMULATION ABOVE
LEL.

Protective Gloves:PLASTIC OR RUBBER.

Eye Protection:SAFETY GOGGLES OR GLASSES.

Other Protective Equipment:SAFETY SHOES, SAFETY SHOWER, EYEWASH
FOUNTAIN.

Work Hygienic Practices:NONE SPECIFIED BY MANUFACTURER.

Supplemental Safety and Health

MFR PART NO, TRADE NAME:CALIBRATION GAS 101- 350-N, DC102573.EXPLO
HAZ:INCREASE VENTILATION TO PREVENT FORMATION OF FLAMMABLE MIXTURE
IN LOW AREAS/POCKETS. NOTE:DATA GIVEN FOR PURE ISOBUTYLENE. CYLINDE
R OF HNU SPAN GAS/ISOBUTYLENE CALIBRATION GAS CONTAINS 100 PPM IN
ZERO AIR OR 0.01% ISOBUTYLENE IN AIR.

===== Physical/Chemical Properties =====

Boiling Pt:B.P. Text:19.6F,-6.9C

Melt/Freeze Pt:M.P/F.P Text:-221F,-140C

Vapor Pres:@20C 24SIG

Vapor Density:1.95

Spec Gravity:0.59

Solubility in Water:UNAVAILABLE

Appearance and Odor:CLEAR UNPLEASANT ODOR SIMILAR TO COAL GAS

===== Stability and Reactivity Data =====

Stability Indicator/Materials to Avoid:YES
OXIDIZERS.

Stability Condition to Avoid:NONE SPECIFIED BY MANUFACTURER.

Hazardous Decomposition Products:NONE

===== Disposal Considerations =====

Waste Disposal Methods:DISPOSAL MUST BE I/A/W FED, STATE AND LOCAL
REGULATIONS.

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